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**Philosophy of change, by D. P. Rhodes.**



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# THE PHILOSOPHY OF CHANGE



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# THE PHILOSOPHY OF CHANGE

BY

D. P. RHODES  
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## PREFACE

I MUST warn you, reader, at the outset, of certain feats that are to be perpetrated and of certain others that are to be omitted in the course of these pages. Otherwise, as I have it on excellent authority, you may dislike or even despise me, and will be free to revile me for having shamelessly led you into a discussion such as you had no reason to look for under the cover of any book bearing a conventional title.

The purpose of this book is to show that truth has never been, and cannot now be, demonstrated by man as a whole or in any part; that all our so-called truths are of necessity merely errors making in the direction of that universal truth which can never be attained but once, and once attained, cannot endure. But — and this is to be well noted — once this truth is supplanted by error, this error can have no other goal than universal truth. What we commonly regard as error will be seen to have been derived invariably from one of two sources: (1) that which has once been regarded as truth, and (2) conceptions of illusions impossible in fact. Hence between human knowledge and human error there

is no fundamental distinction but only an apparent and practically useful one. To this statement the single exception is embodied in the first principle of this philosophy; and it will be seen that this principle itself is not a complete or perfect truth, but is dependent for its perfection upon the unknown sum of its constituent parts.

It will be observed that time is first implied as a condition of this universal process, and is then denied the value which is commonly assigned to it. This question will form one of the interesting considerations of the book; it is, however, hardly to be approached before a more detailed investigation has supplied the necessary material and terms.

As with truth, so with happiness, which will be found to be indistinguishable from truth. It will be shown that, did we once attain happiness, our chief concern would be lest it should endure, — *i.e.* if we could have any concerns when we had attained absolute truth.

Finally will be considered the relation of this philosophy to our daily lives upon Earth, both now and in a conceivable distant future.

Its outcome should, I think, be called a new, rational, and workable optimism. As I have already stated, the philosophy does not explain experience in the least or most superficial of its phases. Hence you are not to expect from me particular demonstrations, or that I shall establish point after par-

ticular point conclusively and expressibly, for it will appear that I must regard such separate demonstrations and established points as mere will-o'-the-wisps. Nevertheless, I make the highest pretensions; and if I can but make the philosophy intelligible, you should be able to apply its results practically in a great variety of ways, without difficulty or hesitation. For I have interpreted experience generally in the light of the single significant principle which it reveals; and I have described, in terms by no means too general, the immediate future of a race that has attained to the most rational view of life now possible.

Any who read with interest to the end of this book will perhaps divine that the task of making such announcements as the foregoing was not an altogether congenial one. I should prefer to have my conclusion stand in its proper place, *as a conclusion*, instead of intruding itself thus before the argument, as if it had been arrived at by intuition and then set up as a thing to be proved. For, indeed, at the outset of the investigations here to be recorded, I had no opinions worth mentioning either as to the meaning of the facts of actual life or as to the nature of truth itself. I destroyed all the notes in which I had recorded my arguments for or against the theories of some of my notable predecessors; banished all books from my study; and with no implements further

than pencil and spotless paper, a few brass pins, and a tennis-ball, I set about enquiring seriously into the destiny of man. I even tried to forget who they were that had said anything on the subject before, or that there were such things as jealousies and fashions in philosophy.

In this, of course, I was attempting the impossible. One cannot speculate on the political destiny of a race or on the material destiny of an atom wholly without regard to the individual investigators who have supplied such data as one may use. Nevertheless, some advantages appeared to lie in the elimination, as far as possible, of personal and historical considerations: as, notably, (1) conciseness, (2) the preservation of an attitude as little as possible controversial, and (3) the implied denial that the results of any philosophic thought need be measured by the amount of approval they receive or by their immediate influence upon the lives of men, or that to achieve either individual success or the melioration of mankind upon Earth is in the least necessary as a motive of such thought.

My enquiry complete and reduced to writing, I was warned that my exposition would be found lacking in lucidity by the general reader and philosophical student because in it no attempt was made to show the relation of the doctrine to the history of opinion. It was deemed inadvisable to "dismiss" — as I was accused of doing — with a few para-

graphs so large a subject, for example, as Consciousness, leaving unconsidered the numerous and thoughtfully elaborated theories that have risen around it.

Were I to admit the probable truth of this warning, the wisdom of heeding it would still be quite another matter. If, reader, you are accustomed to regard a philosophical essay as a kind of intellectual exercise leading nowhere in particular but affording you the opportunity of pleasantly overhauling and dispassionately comparing the appropriate items from out your stores of knowledge — if, in short, you are above all a liver and a reader, unalterably convinced of the solidity of the facts of actual life, you will in any case get nothing from my exposition, and I need not cater to you. If, on the other hand, you are determined to draw from your experience of life and books that which is workable and relevant to the future; if you are above all a thinker and eager only to build for yourself and others a rational basis for faith and action, I think you will agree with me, after reading to the end, that no advantage could lie in connecting the points of my doctrine specifically with those of other doctrines unless, indeed, this were done in a thoroughgoing fashion such as I at least should be incapable of. For I have, in the course of my constructive work, taken account by implication of every theory of life, matter, and thought that is known to me; and

though I have occasionally, and for the sake of brevity, alluded to a theory by its commonly accepted name, I have generally thought it unnecessary, and on the whole unsuitable, to define my attitude towards any theory more fully than is implied in the results of this constructive work.

For example, I may again mention my treatment of the problem of Consciousness. Some time ago I used to regard the conscious self as a thing apart and cover whole reams with definitions of it and speculations as to its origin. At present my task is quite different. This whole book is, for one thing, designed to provide rational grounds for belief in a certain general principle of which one expression, though by no means the most interesting, is "Consciousness is not a thing apart nor an essential property of, or resident in, anything; it is a symbol popular in the present age." If these grounds of belief have indeed been provided, a single sentence is sufficient to account for the origin of the term Consciousness, and for our traditional conception of this faculty as belonging to some things and not to others, and to some things in greater degree than to others. This whole book, then, is about Consciousness, although the term itself seldom appears. But if I have failed to make clear to you the general theory, no specific criticisms from me of other theories of Consciousness would be worth your while. From my own point of view they would be sheer

redundancies; nay more, they would be in the nature of an apology such as I do not feel called upon to make.

The same would be true of any discussion in these pages of specific doctrines of divinity, world-will, or of any other universal or extra-universal force that has been cast for the classic rôle of final cause.

Hence — even though I should admit, in the case of more special treatises, the expediency of a more conventional method — I cannot see that the general unity of my doctrine would be rendered more intelligible by any effort of mine to assign to each phase of it a place in the history of thought.

As an aid to the presentation of this general doctrine, I will here define a certain liberty that is to be taken with the terms, theory and practice, in the ensuing pages.

In traditional speech a practical idea is generally understood as a useful one; as an idea which may, with advantage to somebody, be immediately incorporated in practice; whilst a theoretical idea, whether presumably sound or unsound, is understood as one belonging primarily to the realm of abstract speculation and not necessarily related to practice. To this usage I make no objection: it possesses obvious advantages of convenience. But, for the purposes of this work, it will be found desirable to keep the teleological aspect of the terms

in question generally uppermost. By practice, then, will be understood that which must eventually be replaced by new and different practice; by theory, that which may conceivably be translated into practice. In these pages theory shall cease to be theory when one of two things happens: when it shows itself finally incapable of translation into practice, or when it has actually been translated into practice. By practice will be understood human practice; but its relation to theory, as here defined, will be repeated in the relation to theory of all other cosmic processes. A theory of electricity, for example, would be one which, for anything we knew to the contrary, might correctly describe electricity; and if we ever came to know that it either could not or actually did describe electricity, it would cease to be theory.

This verbal innovation need mislead nobody. Nevertheless it requires justification, — and will be justified in the first chapter, — for it not only implies the time-honoured assumption that all things change, but raises the question, What are these things that change? Observe, in passing, some of its implications.

Something, not realised as yet but indefinitely ascertainable, will be the practice of the future to the exclusion of actual practice. That something I choose to call the subject of theoretical thought or, more loosely, theory.



When we speak of the revival of an old practice, we speak as becomes people living in a world which may be apprehended by them only in its successive strata of appearances. Here is a hammer, and it is good to hammer with. Of this much I seem sure; and if I must hammer with it, this much is sufficient. But if I wish to make a better hammer, I must go deeper into the matter and consider that the usefulness of the one I now have lies in the fact of its having a wooden handle and an iron head. Herein is a difference between wood and iron, and I ought to ascertain the nature and extent of this difference. I can weigh them and test their comparative toughness. Along comes somebody who takes my iron and melts it and shows me a lot of things it may do that I had never dreamt of. He explains to me the standing of its atom in the society of atoms, and he even tells me something of the internal organisation of this atom. At which point he stops, because he can go no farther towards the basis of iron in reality. But he has already taken me so far that I can never again look at a hammer in quite the same light, but must admit that it is only with reference to the business of hammering that a hammer may be called such; and that, if the reality behind it ever came to be so well understood that the need to hammer no longer existed, nobody but an antiquary would think of calling it a hammer.

The case of the revival of an old practice is simi-

lar and still more obvious. By analysis of the new practice we have never found that it was, in any factor or in all, equal to the old. Moreover, none of its factors could be equal to the old, for they belong to a different period of time and have all been determined in part by events subsequent to the death of the old practice. What we think we know of either the old or the new practice is, however, very little as compared with what we know we do not know of it. Our admitted ignorance of the events that culminated respectively in the one and the other is all but complete. Since the two appearances resulting thus from processes largely unknown bear similar relations to the peculiar thought of the age or race, we find it convenient to classify them as "likes." Sometimes we use the word "identical."

Any extra-terrestrial contemporary of ours who had learned something of our family history, yet was unaware that different practices often appeared to us similar, would nevertheless guess this to be the case; for it would seem to him probable that any intelligence in which heredity counted for much would continue for long periods to respond to the same influences determining the character of events. That is to say, it would be determined by influences derived from events whose local relation to the proximately ancestral intelligence was immediate. Ignoring the vastly greater number of influences which, if known, would reveal the universal diversity

of events, the possessors of this intelligence must regard certain events as preëminently similar.

The universal diversity implied in the law of continuous change is a subject that will be frequently recurred to in these pages. For the moment, we may be content to conjecture that it would not surprise our extra-terrestrial critic to learn that a dozen of us might walk through a wood and agree that it was a very monotonous walk, while the dog that accompanied us and came upon twenty different scents found in it a fascinating variety; or, on the other hand, that the dog might be greatly bored with looking over his master's shoulder as he read. For he would suspect that the history of men or of dogs would repeat itself indefinitely during such period as purely ancestral ideas might maintain an overwhelming prominence in terrestrial thought.

Another warning: my language at times becomes colloquial. This is emphatically a serious work, and dignity or gravity of attitude has no place in the execution of it. In another place (Chap. IX) I shall try to point out some of the dangers to the serious thinker inherent in any effort to maintain the dignity of himself or of his subject; also to account for the esteem that is generally accorded to dignity of attitude in certain professions.

Since I have at the outset been forced into a monitory attitude, I should perhaps try to give in a

few words some further positive idea of the method followed in this philosophy. Briefly, then, its central motif is expressed in the two following paragraphs.

Any doctrine of a final cause is shown to be not merely unsatisfactory by reason of its incompleteness but to be untenable even provisionally, since the cause, to exist as such, could have no contact with our universe unless it were identified with it and so ceased to be a cause. This conclusion is arrived at logically; and logic itself is shown to lose its competence as absolute truth is approached. Nevertheless, logic may enable us to reject a doctrine which logic has supplied. And the fact that logic has driven the vast majority of mankind to accept, in one form or another, the doctrine of a final cause and to cling to it — not confidently but desperately, with doubts, differences, exceptions, backsliding — through many generations is shown to furnish an additional reason for rejecting this doctrine. If a final cause is both inconceivable and useless as a hypothesis, intermediate causes are equally so; thus causation becomes merely a convenient manner of speaking doomed, even as such, to desuetude.

Bereft of causation as a means of accounting for the facts or illusions of existence — which is surely one expression of the avowed aim of philosophy — we have to look about us and enquire what is apparent in this existence. And there appear to be (1) Things, such as matter and ideas, and (2) a

Process or Processes. But the same logic which forced us to eliminate causation (which might be numbered (3)) convinces us that (1) and (2) cannot exist otherwise than identically; and, for present suggestiveness of terms, we give to existence or the universe the name of Process. This process is described as consisting in the successive manifestation of all possible differences or illusions until perfect truth is attained. It is unconditioned by space or time, which are but two of its illusions; and when absolute truth gives place to absolute error, the process remains the same in that fixity which implies its complete diversity.

Here, as I have said, is one statement of that central motif of the philosophy which will, in the course of these pages, be presented from a number of different points of view. And in a number of ways will be expressed the optimism of the philosopher — all of them different from the glowing phrases associated with that obsolescent mental bias which commonly goes by the name of optimism.

The book itself is divided as follows:

Chapter I shows the origin of the theory in common knowledge as well as some of its general implications.

In Chapter II are reviewed the principles which seem to underlie man's social, political, and intellectual life and moral ideals. This is done in the form of an enquiry into the possible destiny of his various activities, viewed in the light of their past.

In Chapter III is considered the universe of matter and ether. An elementary universe (*i.e.* a universe in which matter has not been evolved) is postulated, as different as possible from every hypothetical universe whose relation to human thought is most obviously illusory according to the principles developed in this one and the earlier chapters. The postulated universe is, in other words, a "chaotic" one which may be indefinitely maintained in thought throughout its emergence from chaos to become the possible home of matter possessing apparent geometrical form.

With these first three chapters the philosophy is complete — complete, it will be understood, in its theoretical and generally practical aspects. No further development of the theory should be looked for in the remaining six chapters, the purpose of which is to help to define the general trend of the theory and the probable consequences of its adoption by mankind.

In Chapter IV, I have endeavoured to point out the true importance of the problems of Reason and Will.

Chapter V shows the bearing of this philosophy upon the special theory of dissolution.

Chapter VI deals with the relation between life and death.

Chapter VII treats of the manner of life of any terrestrial race who should hold as rational a view

of death as is now attainable. In it this philosophy is seen at work amongst a hypothetical race in all respects like the present generation of mankind, save that their intellectual and political leaders have made this philosophy their own.

Chapter VIII contains a series of random observations upon life as we know it, and treats of the uses of rational pessimism.

Chapter IX contains some remarks on literary style and other questions of taste and criticism.

A word, finally, as to the claims to be made for this philosophy. Its basis has already been proclaimed to be the principle of continuous and universal change; notice has been given that the universe would be found not as a thing but as a process. And it is not contended that this principle of change, as here set forth, is a complete and perfect truth. Such a contention would of course amount to repudiation of the principle itself, as would also the contention that any one of us to-day may represent to himself concretely how change may take place if there is no thing to change.

What will be claimed for this principle is that,

(1) It is inevitably derived from experience up to date.

(2) It is the most general and abstract of all principles and, as such, permits of the utmost possible amount of filling in of detail, at the same time

that it is incapable of being undermined by new knowledge. That is to say, it is a fixed principle by virtue of its being capable of the utmost possible amount of that modification which is necessary to give it meaning.

(3) In the light of its implications the abandonment of outworn practices and prepossessions becomes an obvious duty. Specifically, it is the only weapon competent to overcome those influences in human society which admittedly make for the most irrational conduct, — *i.e.* it is the only aid to a rational view of death and suffering.

We are to begin with a synopsis of the philosophy in its general aspect.



# TABLE OF CONTENTS

	PAGE
PREFACE . . . . .	V

## CHAPTER I

### ILLUSION AND REALITY

The two truths of highest probability . . . . .	1
Significance in experience . . . . .	5
Change . . . . .	6
Matter . . . . .	7
Substance . . . . .	8
Ideas . . . . .	11
Time and Space . . . . .	13
Change homogeneous . . . . .	14
Change without antecedent, beginning, or end . . . . .	15
Impossible illusions . . . . .	15
Illusion and reality . . . . .	16
Change a fixed principle . . . . .	17
The order of illusions . . . . .	18
Change and geometry . . . . .	19
Recapitulation . . . . .	21

## CHAPTER II

### THE KNOWING

Egoism and altruism . . . . .	24
In politics . . . . .	24
In considerations of property . . . . .	41
In the pursuit of fame . . . . .	43
In vices of the senses . . . . .	43
In love . . . . .	44
In all acts judged by ethical standards . . . . .	48
Practice of an art for its own sake ; the pursuit of knowledge . . . . .	49

	PAGE
The test of applicability . . . . .	55
What are egoism and altruism? . . . . .	56
The knowing . . . . .	58
How the process of gaining new experience appears to us of to-day . . . . .	59
Destiny of the knowing . . . . .	61
The perfect knower . . . . .	62
May all the knowable be known? . . . . .	68
Thought imperishable . . . . .	69
Cumulative efficiency of thought- and matter-effects .	71
Evolution and heredity . . . . .	75
The ultra-evolutionary necessity . . . . .	77
Time and ultra-evolutionary advantages . . . . .	80
Terrestrial knowledge evolutionary in character . .	81
Impossibility of universal devolution . . . . .	82

## CHAPTER III

## THE FICTION OF A UNIVERSE

Necessity of physical and mathematical symbols . . . . .	84
Man a "born metaphysician" . . . . .	85
The universe of one dimension . . . . .	86
Preliminary survey of the "cosmon" . . . . .	92
The sole attribute of the "cosmoids" . . . . .	94
<i>K</i> 1 and the earliest motions of the cosmoids . . . . .	96
The reality behind the cosmoid . . . . .	101
The correspondence between the "real" and the "apparent" cosmoid . . . . .	109
Careers of the apparent cosmoids . . . . .	113
The "centre-change" . . . . .	116
The centre-change and the surrounding cosmon . . . . .	118
Self-assertiveness of the ultimate principle . . . . .	124
The geometrical point . . . . .	127
The illusory "thing" postulated for the apprehension of motion	129
Systems of supply for centre-changes . . . . .	131
Numbers and the symbolical cosmon . . . . .	153
Mobile centre-changes and their inertia . . . . .	157



## CHAPTER IV

## REASON AND WILL

	PAGE
The meaning of consciousness . . . . .	269
How a thing may be aware of itself . . . . .	272
True importance of the problems of Reason and Will . . . . .	273
The will to live . . . . .	274

## CHAPTER V

## DEVOLUTION

The conscientious carmen . . . . .	278
Problematical future effect of man upon the evolutionary process . . . . .	279
Annihilation and afterwards . . . . .	281
The ultra-evolutionary look-out . . . . .	284
The developing hand of time . . . . .	284

## CHAPTER VI

## A RATIONAL VIEW OF DEATH

Posterity and suicide . . . . .	286
The gain in gaiety and the loss in bliss . . . . .	288
If I die this day, what next? . . . . .	289
Relation between the ultra-evolutionary self and the evolu- tionary . . . . .	290
Emotional aspect of the case . . . . .	291
The process of gathering . . . . .	293
The marriage of pain and pleasure, and the family of events	295
The miserable and the rule of destiny . . . . .	296
"Those good old days when we were so unhappy;" sinister implications of the word "again" . . . . .	297
Evolutionary benefits inherent in the word "again" . . . . .	299
Paradise and the kinematograph . . . . .	300

## CHAPTER VII

## IMMEDIATE IMPLICATIONS OF A RATIONAL VIEW OF DEATH

	PAGE
The achievements of morality . . . . .	301
A rational society . . . . .	304
The case of its drunkards . . . . .	305
The case of its amorists . . . . .	314
The case of its liars . . . . .	319
The case of its brawlers . . . . .	319
The case of its invalids . . . . .	320
The rational society not impossible . . . . .	321
The rational society not millennial . . . . .	328
The rational society not to be had for the asking . . . . .	332

## CHAPTER VIII

## THE LOVE OF TRUTH

How the love of truth may be defined . . . . .	348
Our racial belief in the supernatural . . . . .	350
Instances of the love of truth . . . . .	353
The honest theorist as an everyday liar . . . . .	357
Conservatism <i>vs.</i> Radicalism . . . . .	362
The processes of nature and of civilisation alike irreversible . . . . .	364
“Lead me to the precipice” . . . . .	365
Theory, superstitions, and laboratories . . . . .	366
The snubbing of theory . . . . .	368
The menace of words . . . . .	369
The wisdom of age . . . . .	369
The plum tree of civilisation . . . . .	371

## CHAPTER IX

## STYLE AND THE PHILOSOPHY

Certainties and probabilities: a recapitulation . . . . .	376
Long sentences . . . . .	378
The generic “we” . . . . .	379
The rationale of dignity . . . . .	383



# TABLE OF DIAGRAMS

	PAGE
Figure 1 . . . . .	92
Figure 2 . . . . .	98
Figure 3 . . . . .	98
Figure 4 . . . . .	98
Figure 5 . . . . .	99
Figure 6 . . . . .	117
Figure 7 . . . . .	119
Figure 8 . . . . .	123
Figure 9 . . . . .	124
Figure 10 . . . . .	138
Figure 11 . . . . .	143
Figure 12 . . . . .	145
Figure 13 . . . . .	149
Figure 14 . . . . .	151
Figure 15 . . . . .	162
Figure 16 . . . . .	163
Figure 17 . . . . .	164
Figure 18 . . . . .	164
Figure 19 . . . . .	223





# THE PHILOSOPHY OF CHANGE

## CHAPTER I

### ILLUSION AND REALITY

FROM the study of history, from the review and comparison of our own individual experiences, and from the results of all special scientific and philosophic research, we draw two conclusions or truths possessing, of all truths, the highest probability. In all ages they have been more or less clearly recognised and variously stated by men of the most widely different tempers and environments. Roughly speaking, they have acquired greater prominence almost continuously with the lapse of time; and one of the distinguishing features of the present age is the new boldness of relief in which these truths stand forth for every curious person to view. One of them, the first here to be mentioned, might be discussed at indefinite length, although one of the advantages of living in the twentieth century is that a brief statement of this truth with a few illustrations suffice to awaken the echoes in common knowledge. The second truth is generally regarded as self-evident and does not appear to permit of much discussion.

(1) Every particular experience is illusory.

This familiar object, the pencil I now hold in my hand, is not merely a complete mystery to me. It is not merely that I am in doubt as to which of my ideas of its form, the materials of which it is made, their relations to one another, etc., are true ones. I know, if I know anything, that form, materials, relation, etc., are all entirely different from what they appear to me; that the latest or most intimate knowledge of wood and graphite in a pencil provides for its own abdication in favour of other knowledge. I know, moreover, that the real form, materials, and relation — supposing them to exist — could not appear to me at all.

The chemist dealing with his old friend, the atom of hydrogen, is in a similar case, for he knows that the familiar behaviour of this atom is merely the particular illusion which corresponds to the competence of his five senses and many instruments. If his senses and instruments were fundamentally different, — and he knows that senses and instruments have not remained, and cannot be expected to remain the same, — the behaviour of an atom of hydrogen would be something that could not be spoken or thought of by any but a historian.

The arithmetician contemplating two pebbles knows that there is far better reason to regard the universe as one than the pebbles as two. All portions of his pebbles should, then, be as intimately

and significantly related as all portions of either one of them. But he had in the pebbles themselves the best of reasons for repudiating the plural. For, knowing the pebbles to be illusory, he must deny his poor understanding any significance whatever if he persist in regarding as valid the two.

My conception of a past event, a fact, whether derived from memory or from reading of it in a book, fails to equal anybody else's conception of the same event because I know that my own mind is just as certainly not the other person's mind as it is not exclusively my own. And what of the fact conceived? Supposing it was "John went to London," and that a thousand people saw him go, — it is impossible that any of these people should have known what this John was that went, nor if his going was any more of a going than if he had remained where he was. On the contrary, nothing can be more certain than that John and his going and his destination were not what they appeared to be nor where.

The first conclusion of highest probability is, then, that we not only do not know anything certainly of particular experiences, but that we cannot even be guessing them aright.

When we come to groups of particular experiences, this high probability is sensibly reduced. My pencil, to be sure, and the chemist's atom of hydrogen constitute groups of experiences; yet, the further these groups are extended, the more difficult does

it become to discredit all positive statements about them.

For example, though I admit my incompetence to define any of the consequences of my brother becoming a thief, I assert my competence to predict that, if mankind continues to exist upon Earth for a certain space under conditions tolerably similar to present conditions, certain things will happen whose significance may form the subject of legitimate positive statements.

Nor shall anybody tell me that I know better than to make a positive statement about altruism.

Mankind, as we regard it, is a small thing in the universe, and so is altruism. The statements that may safely be made about either are perhaps of the slenderest and sketchiest nature; nevertheless, they are neither necessarily negative nor certainly illusory.

Hence we must conclude that, though every single experience is illusory in its particular aspect, it may not be so in some aspect which it shares with other experiences.

Let us pass on to the second truth of highest probability.

(2) Experience, illusory though it be in every particular, must nevertheless possess some significance.

Otherwise we could not have drawn our first conclusion of highest probability.

Otherwise it could never have occurred to us to attack the problem of existence.

Not only do I recognise the necessity of some significance in this pencil from my point of view, but I must recognise the same necessity in any considerations, from my brother's point of view, that should impel him to become a thief. For I must attribute some significance to my brother and to the possibility of becoming a thief. And in precisely similar fashion must I attribute significance to the careers of those waves of the steaming sea that preceded any creatures capable of perceiving them through sight or touch. For they must have had their successive starting-points from which to encounter new illusions just as I and my brother now have.

Once significance in experience is recognised, it becomes the obvious and rational thing to do to try and discover wherein this significance lies. This endeavour cannot, of course, end in the discovery of a perfect truth, since all the illusions that go to make up experience are in themselves now insoluble. But it should at least result in some kind of positive statement representing the competence or relative fulness of experience up to date.

Since any positive statement of a particular nature may be effectually contradicted whilst it is less easy to contradict positive statements relating to groups of illusions, it seems inevitable that the greatest significance will be found in statements that relate to the greatest number of illusions.

Let us enquire what is thus positively significant.

Change is significant, for change is everywhere. It is at least as general an attribute of our apparent universe as any that can be named or thought of. Whether or not permanence is also a general attribute of this universe, we may at least deny that either man or the objects of his experience could have any existence in which Change was not involved.

Our solar system could never be wholly deprived of heat or of motion as a whole, nor join with other systems to bring about such a death while matter existed for such systems to be made up of.

Nor could mind come to rest in perfect calm without ceasing to be mind. A mind from which such forms of Change, at least, as contemplation and reflection were absent would be most literal nonsense.

There is Change, then, in motion and in what we call rest; Change in life, in the granite, and the deep-embedded diamond. Recent experiments have shown us that every atom of matter is itself the seat of tremendous bustle apart from the impulses transmitted to it from other atoms. As for us humans, the more of obvious and superficial change we enjoy at any time, the more depressing is both the prospect and the realisation of a less varied existence. For any approach to monotony of experience we must draw on our imagination, since it is not actually to be found in the lives of our fellow-men. The life of the indolent hermit or of the imprisoned criminal does not differ in very many respects from that

of the active man of the world, yet this difference is often sufficient to account for the derangement of health or reason in them who lead the simpler life.

In sum, — from the particular illusions of our experience we derive Change as a general and significant principle of the apparent universe.

We have now to enquire what else is significant.

Things, perhaps, such as matter or substance, and ideas.

It is obvious that these two categories, substance and ideas, must at best possess far less significance, separately or taken together, than Change. For we have never been able to agree that either or both of them were everywhere. In fact, most of us regard them as confined to very tiny portions of the apparent universe. In the ether, we all agree, is Change; but we rarely hear anybody say he has good reason to believe that the ether is a substance or that there is a substance in the ether. On the other hand, they are quite as rare who pretend to have discovered ideas in the rocks and waves of the seashore. The significance of Things, then, appears to be either slight or altogether dubious at the outset.

Nevertheless, in most particular occurrences upon Earth, we do not conceive Change apart from Things. The phenomena of electricity and magnetism cannot very satisfactorily be conceived as

related immediately and throughout to Things, yet a Thing is generally implied in their practical outcome. And in the vast preponderance of the affairs of daily life, it is a Thing — *i.e.* an idea or a material object — that appears to change. Hence we should test the claim of Things to significance. Let us begin with matter or substance.

Recent experiments in electrical science have shown us that the atoms of matter are both divisible and disruptible, and that their constituent parts are not material nor, so far as known, suggestive of any other kind of hypothetical substance. An atom is found to consist of a number of units of negative electricity separated by “empty space” and revolving about a central core or “ion” concerning which nothing positive is known. It is clear, however, that this “ion” cannot itself be an atom. In the light of this discovery, the “elements” of matter have lost all meaning in any discussion of a first principle, and “matter” itself has persisted solely as a convenient manner of speaking. For nobody now pretends that matter is the ultimate basis of phenomena or is anything else than a complex appearance involved in the appearances that we call phenomena.

With matter bereft of that ultimate or basic quality which was formerly assigned to it, we find it exceedingly difficult to speak of “substance” at all. Hitherto we have always been so impressed with



the tangible, visible, ponderable, impenetrable character of the illusions which have constituted nearly the whole concern of our lives throughout thousands of generations, that it has seemed only natural to assume some kind of substance in places where matter was not but somehow ought to be. Now, though, the assumption seems entirely gratuitous.

However, it is impossible to forget that we are the present culmination of those thousands of generations who were too busy or greedy, too pious or lazy, to invent electrical machines. First and foremost we belong to our forefathers. Hence we should test the claims of "substance" as if it were the most rational assumption possible.

All that can be intelligibly postulated of Substance is permanence, for it is now out of the question to assign to it any of the other properties of matter. What we are to regard, then, as the possible basis of the ether (or perhaps as the ether itself) and of electrons and eventually of matter itself, is a Permanent Thing whose existence may contain innumerable vicissitudes whilst its nature remains unaltered.

In the first place, let us assume that there is but one kind of substance. In this case the unit of Substance will be

- (1) the universe itself, or
- (2) the least portion of the universe, or
- (3) something between the two.

Under (1), Substance could experience no vicissitudes within itself nor indeed in any way whatsoever unless there were another and heterogeneous universe outside of Substance. In other words, the Change, of which we are aware in all the illusions of our experience, could possess no significance. This is contrary to our conclusions of highest probability.

Under (2), the units of Substance would be exactly alike except in respect of the vicissitudes of their careers. That is to say, omniscience itself could not include the power to distinguish them except through their changes of position. Such Substance would, then, be dependent for its significance exclusively upon Change, and any units that were permanent in any respect would be meaningless in every respect.

Under (3), the same would always be true if all the units were alike, and sometimes true if, within different classes, all units were alike. In the latter case, units might sometimes lack permanence, hence could never have possessed it. If all the units differed among themselves, there must either be very few units (which would be a case similar to (1)), or else there must be a very great diversity of units. In the latter case, the more volatile units would flock by themselves, leaving the less volatile units to their own devices. The universe would then be like a continuously shaded and unchanging spectrum; and there could be nothing in Permanence competent

to upset this arrangement which would amount to a state of rest.

If there were more than one kind of Substance, there would be more than one kind of Permanence — *i.e.* more than one universe.

Neither matter nor substance, then, can possess any fundamental significance. Matter is a convenient name for certain complex appearances involved in the phenomena that constitute the bulk of our particular experiences. And substance is another name given to the basis of matter itself and to those immaterial media through which phenomena are apparently produced.

Change alone is significant in the iron of the hammer, in the magnetic waves in the ether, and in the “empty space” within the atom. And when I stated in the preface that this first principle of the universe was incapable of being undermined by new knowledge, I spoke legitimately, as from the standpoint of a race who had never heard of Substance and could no more think of inventing it than they could think of inventing dragons — which, after all, could not be dragons — to explain meteoric phenomena.

When we come to seek a fundamental significance in Ideas, we encounter the same obstacles as in the case of Substance.

In recognising that, of all the testimony of our

experience, Change alone possessed universal significance, we implied that all the contents or apparently separate portions of the universe were inseparably allied by this principle. We could no longer regard any particular manifestation of Change as isolated from any other such manifestation. For example, the relation of the stone to the mountain-side down which it is rolling is no more significant than its relation to the nearest fixed star, for the star is just as essential a condition of its change of apparent position as is the mountain.

Ideas, then, must be similarly interdependent and incapable of being isolated from one another or from the most remote appearances of the Substance-world. Each Idea exists solely by virtue of the change in its relation to all other Ideas and Substance-appearances. The Idea of a pebble is conditioned by all other pebbles and Ideas of them. An Idea of altruism is conditioned by the equally general Ideas of egoism, humanity, love, etc., all of which are continuously changing. The existing Idea of Change is conditioned by the equally general Idea of the Impossible, and is made up of the invariably unexploited (*i.e.* lacking complete experience) factors in particular Ideas and Substance-appearances. An Idea cannot endure; it is continuously being supplanted. No two persons have ever had the same Idea of altruism, although either might perhaps have made a justifiable positive statement

about altruism to which the other could agree from his own equally justifiable point of view — the agreement resulting in an apparent practical advantage to somebody. Nor has any one person had the same Idea in two different moments of time, even the Idea of Change being conditioned by successive particular experiences.

Ideas, in sum, are not Things Changing but Change. And the same is, of course, true of conscious selves and of any other form of activity involving body-matter, brain-matter, substance-appearances, and ideas.

Even without the aid of formal logic, the choice between Change and Things was an easy one; for we cannot get on at all without Change, whereas we have never had any good reason to believe in Things in General or in any one Thing in Particular, so we can give them up without a qualm.

Consulting again our illusory experience, do we find anything else possessing general significance?

There are Time and Space, to be sure; but, now that we have got rid of Things, we identify them unhesitatingly with one another and with Change. For apart from the Change manifested in vision, touch, or any reciprocal action, as between the rocks and waves of the seashore, they could have no existence.

Is there anything else in our experience that appears to possess some general significance?

There is nothing.

We have now to discuss Change itself and its relation as a whole to the impenetrable particular illusions of human and other experience.

In the first place, there cannot be more than one kind of change; *i.e.* the change manifested in a magnetic wave or in the wearing down of a river's bed cannot be different from the change manifested in a politician's reflections on the events of the day. For if change here differed from change because of the difference in its manifestations, there must be as many different kinds of change as there are manifestations of it. In other words, change would then exist as a mass of unrelated particulars and could never have suggested itself as possessing any general significance. But if change here differed from change because its seats, the ether, the river-bed, and the mind of the politician, belong to two or to three essentially different classes of things, it is obvious that Change is not in question but Things Changing, which we have seen to be impossible. It is, then, inevitable that qualitative differences in experience (*i.e.* in the manifestations of Change) consist in what we call "quantitative" differences in ultimate Change itself; or, to use a more suitable term, they consist in differences of position in the fixed order of Change. One purpose of the universe of one dimension postulated in Chapter III is to show how differences in experience may be thus quantitatively conceived.

Moreover, Change cannot be derived from something else, for the act of derivation would merge its antecedent with itself. One illusion may follow upon others; but Change itself could not, say, be created by something immutable, for the immutable thing would become Change in the act of creation. Nor, for the same reason, could there ever be any interaction between the two.

Similarly, Change could have no kind of beginning or end. If it began, it must already have been Change by virtue of the beginning; if it ended, the ending would show that it still existed.

Furthermore, Change does not manifest itself in the impossible. For example, it may, in this year 1908 A.D. upon Earth, manifest itself in my illusory idea of a three-footed hen; but it may not manifest itself in an illusory three-footed hen which, like the illusory two-footed hens, lays illusory eggs with which illusory hunger may be appeased. For we take account of illusions without knowing what they are or what we are that take such account; otherwise we should not be concerned with this problem of existence. And at the end of next December we can be certain that amongst all the illusory hens of the year there has not been a single one with three feet. Change, then, must manifest itself in all possible illusions, there being a reason indefinitely comprehensible in Change itself for the non-manifestation of such as three-footed hens. Of this anon.

But meanwhile, what do we mean by illusion?

Surely, that which is not reality.

But there is Change in all our illusions, and we have seen that Change alone is significant in existence. Is not reality then significant?

Reality is indeed significant, as the limit of existence. When all illusions have been manifested, reality will then be significant as the limit of all the possible, do-able, changeable. It is obvious that it could not remain thus significant: all possible illusions must then begin, else there could be no limit to them. And if there were no limit to illusions, there could be no impossible illusions. That is to say, we should be confronted with the possibility of a three-footed hen, in every respect a hen, but with three feet; also with the possibility of pure-white blackness. Life could have no value, would be out of the question, on such conditions. Finding ourselves living and concerned with the problem of existence, we unhesitatingly repudiate a limitless universe.

During the life of our race upon Earth we have seldom been willing to regard reality as a limit. Our habitual impulse has been to gaze out into the heavens and dig down into the earth in the hope of seizing hold of it somehow and then preserving it as a priceless possession. This rather emotional impulse has been as fruitful as it was inevitable. And we are now in a position where, by giving our more



rational faculties free play, we may set emotion on edge with dread lest the ancient notion of reality be vindicated. For nothing can be more dismal or stultifying than the implications of any doctrine which represents our life of ceaseless change as rooted in an immovable bed of fact. These implications will be reviewed at some length in the next chapter.

To consider, now, the conclusion at which we have arrived, to wit, Reality = that which *is* = that which may not *become* = the impossible:

Is this conclusion to be treated as a truth of the highest possible value?

For any practical purpose whatsoever it is of course desirable to treat it thus. Its own implications, however, render such a treatment fundamentally irrelevant. More appropriately may it be regarded as a statement made under compulsion. It is one form of declaration of that first principle of existence the recognition of which is imposed upon all who put to themselves any short series of obvious questions such as those put in this chapter. Moreover, experience up to date shows us that no conflicting statement will ever be possible. But its value is necessarily partial, incomplete, and we have no reason to rate this value either high or low. For new illusions still remain to be manifested, and we know not what they may be, what are the possible ones. Change, in other words, is not yet defined.

Hence the principle of continuous and universal

change, as here set forth, cannot be a perfect truth, but is simply an abstract statement inevitably derived from the testimony of the illusions of common experience which are unanimous on this point and on no other. It is a fixed principle by virtue of its being capable of the utmost possible amount of such modification as may give it meaning.

Here we have seen logic forcing us to deny its own fundamental competence — which is the rôle of all other illusions as well.

In the matter of values, the case of all illusions is the same. Whether it be a thought, an animal, or a mineral, any given illusion must be destitute of specific value. If the last illusion be termed Omniscience, or the sum of all illusions, it could have no standard for assigning different values to earlier illusions, since each is a necessary phase of the process so summed up. Man could be no more congenial or indispensable to Omniscience than Fish. And Omniscience, to be possible, must straightway become what we may term the first illusion or Chaos. Otherwise Change could not be defined as all possible illusions, and we should now have no heads to be bothered with it.

Illusions, then, have order, not values — which, indeed, was to be stipulated in the first place of the manifestations of uniform change. And we can say a good deal about the order of illusions past and future: for one thing, that they must be entirely

interdependent and that each illusion of the present day sums up all earlier ones in a manner which is inscrutable because of the imperfection of their relations — because, that is, of the absence of the remaining possible illusions which alone could establish the particular bearing of those already manifested. Only of Change, the general principle, is the bearing obvious, because illusions are necessarily unanimous in proclaiming it. We see, furthermore, that the order of illusions is not reversible; that man, for example, could not grow from the grave backward to the mother's breast. Such a development could not be human; and it could be nothing if not human, for the impossibility thus conceived comprises every incident of a life peculiarly human.

The order of illusions, general and particular, past and future, will form a considerable portion of the subject-matter of this book.

The principle of continuous and universal change has here been treated as if derived from the two conclusions of highest probability that are drawn from experience. It may quite as well be regarded as determining those two conclusions, thus

Change	{	Particular experience illusory.
		Significance in all experience.

Certain of its special implications have already been mentioned. A typical case, finally, is the following.

It is undoubtedly useful to prove that the sum of the angles of a triangle is equal to two right angles, when you are living in a world which you can as yet understand only through its superficial manifestations of matter, straight lines, etc., and when daily needs require you to assume that things equal to the same thing are equal to each other. When, however, repeated scrutinies of the data of such a life force you to admit that its matter and straight lines must eventually, like all other appearances, evolve themselves first into the category of obsolete symbols and afterwards into that of future potentialities, and when equality comes home to you in its true character of practical substitute for that knowledge of universal diversity which is not immediately available, you at once perceive the temporal character of the properties of angles. Unless, that is, your business in life happens to be with angles. In that case, it will be hardly surprising if, before accepting the results of the general scrutiny of phenomena, you redouble your efforts to demonstrate the value of angles as a measure of these phenomena.

It is useful to prove that a jug will hold water, provided there is water to be carried. If there is no water, of what use is the jug and how is the proof possible? Yet the maker of jugs may think of the failing market for them and of the misery of a jugless humanity before he asks himself how he is to quench his own thirst.

Sweet reader, let me recapitulate. For I am convinced that a fundamental principle, if it be in any respect novel, should be stated and restated up to the last limit of endurance.

The central point now at issue in all philosophy concerns "to be" and "to know." If you are a critical philosopher with a qualitative point of view and forbid me to take liberties with these two verbs, I must reply that I have explained and justified the license. I must use these verbs; no others are available; and I must use them in an unusual sense. Here is the whole matter in a nutshell:

Throughout long centuries we have been "knowing," as we say. And we must all assume that this knowledge possesses some significance. Eventually it leads us to the conviction that every particular contained in it is contradictory of, or finally incompatible with, some other particular, except only in respect of Change, wherein all particulars agree. This agreement means that "being" is not to be sought after, is impossible; and that "knowing," even unto Omniscience, is purely a matter of Illusion or Change.

Change, then, is "known" in contrast with the Impossible or Real, and its content is the illusions of everyday existence. I gain to-day a better conception (one obviously conflicting with less of the testimony of other experience) of a certain event than my brother was able to gain yesterday. Om-

niscience will fill in all the illusory detail to which I am blind by reason of my position in the fixed order of Change. Omniscience is satisfied in the possession of all illusions, having no jurisdiction in the realm of impossibilities. Omniscience will have nothing to do with three-footed hens, but will explain my present conception of such a hen.

Meanwhile we of to-day, as well as all the material objects of our world, embody the totality of earlier experience, for the principle of Change implies the unity of the universe, denies the possibility of Nothing, and stipulates for the thorough interaction of what we call matter and mind. The highest form of actual reason is, then, a summation of experience; and the most highly conscious human being is of necessity a local and imperfect product of Change. He embodies all the elements that are making for the perfect summation of universal experience; yet he may feel hunger, anger, hatred, — may habitually regard an atom of hydrogen or an ethical principle as a fixed quantity, — because of the imperfect relations represented by his position in the fixed order of illusions. Change is not yet defined.

Here is the necessity of our situation. Its desirability will be considered (amongst other points) in the next chapter; and in the third chapter will be considered the question, *How* such a situation, with its apparent qualitative differences, might arise. In neither of the next two chapters will this first

chapter be taken for granted, nor will reference be made to it. This means that continuous change will not be *assumed* as the one principle of the universe, although the further discussion of this principle will be abridged in consequence of this chapter.

In Chapter II, the conceivable destinies of human activities are considered in the light of their past.

In Chapter III, an elementary or "chaotic" universe of substance is postulated, and the conceivable happenings in this universe are reviewed, the possibility of substance itself being again considered.

The remaining chapters are in the nature of corollaries, inferences for practical purposes, etc., the subject-matter being still more specific, as explained in the preface.

## CHAPTER II

### THE KNOWING

THE practical politician, if he be a tolerably serious and well-meaning man, often complains that he is unable, while in office or out, to originate or support such measures for the common weal as he believes to carry a promise of enduring efficacy, — that he is sometimes unable even to advocate a measure of temporary expediency, — since, if he did so, his subsequent political usefulness would probably be impaired if not wholly destroyed. The principal influences to some one or more of which he may on any given occasion assign this embarrassment of his effort to do what he believes to be right are well known. They are called the ignorant selfishness of those whom he represents and leads; the exigencies of party dominance; the demands of patriotism; the demands of his own personal ambition.

That such uncompromising politicians as have attempted unswervingly to combat these influences have failed of their highest aim is evidenced by the fact that the influences still exist; whether they have been mitigated in some degree is a question under perennial discussion. To measure the extent and



driving power of any one of them in successive generations is a difficult, and to many historians a fascinating, task. But at the end of the history account must still be taken of the conflict between, on the one hand, the egoism of the ignorant, the egoism of the more enlightened, the egoism of party or class, race or nation, and, on the other hand, a certain opposite or altruistic impulse. And in spite of any real or fancied progress towards an adjustment between these two contending influences, politics are still so far from the point to which fleet-footed theory would bring them that many a serious politician has been forced to abandon his chosen vocation. Probably no man has ever said, "In politics I have found a career in which I am comparatively free to do what I believe to be right;" whilst the contrary is so often repeated as to suggest the possibility that, whatever improvement may have been made in practice itself, the gap between theory and practice is still as wide as ever it was.

However this may be, what course is open to the practical politician if his thoughts incline toward reform? Masses of electors, he knows, are so ignorant and racially backward that the work of advancing them by education to a par with their more enlightened fellows might conceivably be interrupted by the end of the world; personal ambition and party spirit cannot be legislated away; and patriotism cannot be purged of selfishness by a far-sighted

diplomacy. Sooner or later, probably, he will be reminded that the most successful politicians, and by no means necessarily the least liberal or progressive, have refused to gaze steadily into the great gulf that lies between theory and practice for fear of yielding giddily to the impulse to fling themselves in, as if they would close it up with their dead bodies. They have instead looked carefully to their own foothold from whence, keeping ever in view the dim outline opposite, they have built painfully, now staying as best they might the hand of the destroyer, now lowering block upon block into the unmeasured void. And for knowledge of what they may owe in shortened labour to the bones of them who overgazed their prudence, they must look to the day, if that day is indeed to come, when all may pass safely over, and the bridge itself is flooded with a light more powerful than science or the heavens can now command.

Such admittedly is the career of politics that it holds out no promise of success to him who persists in ranting at its abuses or brooding on its futility. The active politician may never lose sight of the exigencies of actual practice.

The case of the spectator and avowed theorist is somewhat different. This one, secure in his aerial flight, may look down into the political gulf with a feeling of comparative tranquillity, and may confine his attention to the task of discovering, if pos-

sible, what is its meaning, its extent, its origin, its destiny. Of these four lines of investigation, intertwined though they necessarily are, the one possessing the highest intrinsic interest is that one which belongs to the future. Moreover, the only means of following it is through the past and what we commonly regard as the present; hence any conclusion arrived at as to the future of politics would likewise appertain to the significance of its actual conflicts. Let us begin, then, as spectators and avowed theorists, by enquiring what future development or developments of politics are conceivable.

We have seen that the principal cause of embarrassment to the active politician is the conflict between egoistical and altruistical impulses in both himself and others. This is not to say that other influences outside of politics, such as ill health or personal enmities, may not be quite as obstructive of his efforts; nor that any or all of the observed forms of egoism and altruism may not, on the whole, be eminently desirable. Whether they are desirable or not is primarily a matter of no importance in this enquiry, the object of which is to discover what development of them is possible in the future, if indeed any development is possible. Similarly no account will be taken in the present enquiry of the effect upon politics of ill health, personal enmities, climate, earthquakes, or any other outside influences. Politics, it is true, have to do with all human activities

and conditions of life: with commerce, agriculture, health, personal enmities, even earthquakes. But our immediate concern is with the motives that enable politics to deal with any matter in any manner whatsoever. And these would seem to be intelligibly summarised in the terms egoism and an opposing altruism. In proceeding to indicate the conceivable developments of politics we will, then, assume all conditions outside of politics to remain passive. This is to say, the terrestrial climate shall continue about as it now is, whilst commerce, agriculture, the public health, personal enmities, etc., shall in no way change save in direct response to the action of politics. The conceivable effects upon politics of original developments in the several departments of human activity with which they deal, as well as in the processes of nature, will form the subjects of enquiries to follow.

Under the assumed conditions the destiny of politics will obviously be one of three.

(1) At some period, either in the past or in the future, altruism in politics will have reached the point of its greatest influence, and from that time onward will have gradually yielded to egoism until at some point in the future it will become extinct, leaving politics perfect in their egoism.

(2) At some period, either past or future, egoism will have reached the point of its greatest influence, and from that time onward will have gradually

yielded to altruism until at some point in the future it will become extinct, leaving politics perfect in their altruism.

(3) At some period, either past or future, altruism will have reached the point of its greatest influence; and at some other period, past or future, egoism will have reached the point of its greatest influence. Neither will ever have wholly exterminated the other, and politics will oscillate indefinitely between the two extremes.

In the course of our investigation these three hypotheses will be referred to as respectively (1), (2), and (3).

If the destiny of politics is correctly described in (1), it is clear that their control will eventually devolve upon a single individual who will prescribe for all other men in every detail of those multifarious activities with which politics have to do. An intermediate stage would be that in which each man, politically, should work solely for his own interest so far as is compatible with his consistent abstention from helping another at the same time. The more efficient workers would gradually bring about the political death of the less efficient until the most efficient *one* was left alone in politics. Such a state of society, though perhaps failing to realise perfect egoism in all respects, would nevertheless realise it in respect of politics. It is, moreover, conceivable and, so far as it goes, negatives nothing that we

know. After enquiring if there are any conceivable realisations of perfect egoism in other activities we will return to the instance of it in politics and try to discover what further development of it, if any, is possible.

If the destiny of politics is correctly described in (2), it is clear that their control will eventually devolve upon the mass of mankind taken together, of which every individual will have exactly the same degree of influence and exactly the same political opinions as every other. Such a state of society, though perhaps failing to realise perfect altruism in all respects, would nevertheless realise it in respect of politics. Like (1), it is conceivable and, so far as it goes, negatives nothing we know. After considering any other conceivable realisations of perfect altruism we will return to this one and try to discover what further development of it, if any, is possible.

Under (3), we may with advantage select for examination the two extremes of all supposable cases lying within its scope.

(a) The supposed oscillation of politics will take place between extremes of egoism and altruism such as have already been seen in practice within historical times.

(b) The supposed oscillation will take place through an arc of the greatest magnitude short of perfect egoism, on the one hand, and perfect altruism, on the other.

In the case of (*a*) comparatively few variations of the scheme of politics would be possible. If we should take the political achievements egoistic and altruistic of individuals, of nations, of the average of humanity, during the past few thousand years and impartially shake them together for a few million years more, taking an occasional look as they formed what combinations they would, — surges forward towards either goal, slips backward towards the other, sluggish progressions, partial retrogressions, — we should have at the end of our performance a kaleidoscope of familiar dulness. The antagonism between oligarchy and democracy, between legislative and executive; the preliminaries of war and its prosecution; the benevolence and malevolence of one-man power; the inroads of socialism, — these and all other incidents of politics would be seen in a great number of different combinations sometimes sufficiently novel to deserve new names but never sufficiently novel to conceal from an intelligence equal to that of the average politician of to-day the fact that their basis was an egoism and altruism restricted within bounds incomprehensible to theory. This must in time become subject of vulgar comment handed on from father to son; and, though it seems likely that from now on the records of human achievement will not be exposed to destruction so often as at certain periods in the past, our politician of the distant future would not need to turn a single page

of them in order to realise the limitations of his profession. Then theory, the dweller in brighter worlds, the tolerant mentor of laggard practice, the author of all known movement in politics, must stand dumfounded by this curtailment of her influence at a definite point for which no reason is known or conceivable. It might suddenly occur to the bewildered politician that politics were perhaps subject to a power greater than the power in men and things and either less orderly in its operation or else so different from it that the two could have no point in common, — an unknown and wholly unknowable power which, having denied man's supposed right of partial judgment in any political matter howsoever trivial, ends with denying its own right to be even mentioned in connexion with politics and consequently with proving the absurdity of its own existence, — but this being sheer nonsense, he must see that there is nothing left for political theory but to give up the ghost.

Before proceeding to enquire how political practice would get on without the aid of theory, let us consider the case of the oscillation of politics as described in (b). In this case the number of variations of the scheme of politics would be the greatest possible under (3), and most of them would baffle the intelligence of a politician of to-day if they could be described to him. The science and versatile genius of one who should gain all but complete control of



politics and prescribe for each man in every detail of his various activities is hardly a subject for profitable comparison with the greatest achievements of historical times. For the benefit of such a one many important secrets must have been wrested from the trees, the stones, and the minds of men, whilst error must have been cleared away in prodigious quantities to open up the short cuts by which he might so quickly reach decision and effective performance.<sup>1</sup> On the other hand, the development of the mass of mankind to a point at which every individual has all but exactly the same degree of influence and all but exactly the same political opinions as every other is obviously compatible only with a similar advancement in knowledge and elimination of error.<sup>2</sup>

We of this day are mentally incompetent to follow any supposable future progression in politics, egoistic or altruistic, to any considerable distance beyond such achievements as have been witnessed by ourselves and our forefathers. One thing, however, may safely be said of such a progression. The variations of the political scheme that might occur during

<sup>1</sup> Mental deterioration of his subjects and increased restriction of their activities could hardly be supposed to afford the opportunity of all but absolute and universal sovereignty to a man only equal in mental capacity to the man of to-day; yet if it did, the political consequences would be equivalent to those presently to be described.

<sup>2</sup> Mental deterioration could not be supposed to promote altruism any more than egoism, nor increment of error to be separable from increased divergence of opinions.

the oscillation of politics through the greatest possible arc would in time become entirely familiar to any intelligence that was capable of bringing them about and understanding them. And with the progression of either egoism or altruism beyond the points that we now know, there must go, as we have seen, an intelligence keener to detect those apparent similarities and repetitions which would loom the bulkier in any thought transmitted by heredity as the period of that thought was prolonged. So that this process, (*b*), in so far as it concerns our present enquiry, is precisely the same as (*a*); and the end of it all is that theory stands confronted with the fact that all her efforts have proved ultimately futile; that her palace of perfection is nothing but a fool's paradise, unaccountably so, and at the very next door to achievement's abode; that her inseparable connexion with practice, the sole reason and evidence of her existence, turns out to have been illusory; that she must die absurdly in the conviction of having never lived.

Between (*a*) and (*b*) lie all possible cases in (3); and in our examination of (3) as well as of (1) and (2) it is obviously of no importance whether we understand by politics the politics of a small village or of a great nation or of the average of nations throughout the earth or of any other planet where politics may be supposed to exist. Nor does it matter how great or how small a content anybody

may be disposed to assign to the term politics. We have assumed a practical politician and a body politic and an apparent conflict between, on the one hand, his impulse to serve himself and their impulse to serve themselves, and, on the other hand, his impulse to serve them and their impulse to serve him and one another. These things we had a right to assume because everybody has observed them in politics; more than these things we need not nor could have assumed because nothing further has ever been observed nor is conceivable in politics.

In the case of (3), political theory being dead, and ourselves face to face with the curious question how practice is to get on unaided, we are at once reminded of a certain well-known principle of human activity.

This is the principle that consciousness cannot exist independently of change; that it consists in a new response to something new without — or, to reduce to lowest terms, in the mutual interaction of two things, which, either in themselves or in their actual form, have but now come into being and are passing even with their birth. What at any time affects our consciousness is invariably something which has never affected it before, because belonging to a unique portion of the universe or, say, to a definite point in time. The recollection of a past event is thus an entirely new act and could never be equalled in any respect by a subsequent recol-

lection of the same event although it might appear to be so equalled. And two apples seen at the same time, or the same apple seen at different times, are never quite the same although they may appear the same.

It is clear, then, that we are imperfectly aware of things: the apple changes before our eyes without our being immediately conscious of the change.

It is, however, well known that this consciousness of ours shares with the objects that may affect it the primal need of change. A perfectly monotonous sensation is unknown and impossible; and we must draw largely on our imagination for conceptions of any near approach to monotony. You could not see a chalk mark on the black-board if you did not see the black-board and had never seen one. Even if you had seen black-boards and plenty of other things besides, you could not look at the chalk mark on the board very long at a time, for they would both soon fade from view. When you concentrate your ordinary winking gaze on an apple on the tree, change enters largely into your sensation, for the apple itself is not a homogeneous appearance whilst the background may be highly varied. Yet you will soon find yourself in desperate need of change; and unless you finally turn your head or close your eyes you will assuredly go blind. The same result would follow upon your looking alternately at the apple and at a distant mountain-top.

There are doubtless plenty of dogs and babies that could outgaze you. But suppose a child, endowed only with the sense of hearing, to be born at a time when a single continuous note is being played on an organ; and suppose this sound and no other to remain ever within hearing distance of the child. We can safely say that the child would gain no idea of sound, — would not hear, — although, if other notes were presently played at various intervals, it would indeed begin to hear. Similarly, if it were born into absolute stillness, and later a single continuous note were played, it would gain an idea of sound which, however, would gradually die away along with the memory of the change from stillness to noise.

Since consciousness — which may be roughly defined as the sum of sensations and memories of sensations — is dependent for its continued existence upon change not only in the objects which may affect it, but also in the appearances or sensations representing these objects, it becomes a theoretical necessity, as well as an observed fact, that any approach to monotony in the experience of a consciousness suited, by virtue of its antecedents or of its own earlier experience, to a more varied existence, tends to degrade or even to dissolve such a consciousness. Assuming, for the moment, that consciousness is possessed exclusively by man and the other animals, we note that the lower

animals may lead a normal existence of much narrower scope than is possible to man. Though the mechanism of the human hand and the invention of letters are far more complex than anything to be found in the lives of the lower animals, any man who should be condemned to do nothing but write his own name would soon lose his mind and his life as well.

Conservatism itself is obviously one expression of this principle of change. Men who are unsuited by heredity or by individual experience to highly mercurial conditions of life are deprived of many of their congenial pursuits whenever such conditions are realised in fact. These men cling, not merely with affection, but with fear and desperation, to their old homes, their villages, and their familiar form of government, knowing that any sharp turn of individual fortune or general law would bring with it the most paralysing consequences to their chosen activities. And all men are like these, the difference being only one of degree. For, ignorant as we are of our exact capacity for change, we all recognise certain limits to the aspirations of our age.

In the present enquiry into the destiny of politics we have, then, to bear in mind that increased uniformity of individual experience leads to stagnation and dissolution of the individual consciousness; that the more varied has been the past experience of a species, or of a race, or of an individual, the

more imperative is its demand for continued and improved diversity of experience in the future; that contentment gained is ambition lost and degradation begun; that all conservatism makes for the stability of certain conditions of life as the best means of securing the differentiation of other conditions.

In the light of this principle the ultimate consequences of an indefinite oscillation of politics through egoism and altruism show clearly enough. Theory being powerless to extend the influence of either egoism or altruism beyond a certain point, the increasing redundancy of political experience would become an axiom in the minds of all men. If politics comprised the sum of human activities and if their oscillation was not interrupted by some such calamity as the end of the world, it would undoubtedly end in a calamity tantamount to this one, so far as their human inventors were concerned. All men, that is, would eventually find themselves leading a life immensely narrower, relatively to the increased experience of the race, than that of a man of to-day who was condemned to do nothing but write his own name. Dissolution would quickly follow.

Without stopping at present to discuss the possibility of an end to the world, and before returning to our hypotheses (1) and (2), — according to which either altruism or egoism in politics should eventu-

ally be exterminated by the other, — let us consider some other familiar forms of human activity. For, as we have already observed, politics, though dealing with practically every human concern, do not in themselves constitute all these various concerns. Thus a man may lead an active and varied life who gives no attention whatever to politics. And our hypothesis (3) of indefinite oscillation in politics may therefore contain no menace to the integrity of human consciousness, but may be entirely compatible with an indefinitely continued development of this consciousness. In other words, it is quite conceivable that, after an immense variety of experiments, politics will become so adjusted that conservatism is the unexceptive rule. Then no man could find a career in politics, but all men would, by reason of this exclusion, be freer to develop in other ways. It would thus be politics, not their human inventors, which had suffered dissolution.

In all those forms of human activity lying outside of politics we may expect to find, as in politics themselves, an all-informing egoism and altruism; for, in every act or thought of any man's there appear to be the factors Himself and Other Men or Other Things, just as in every material process there appear to be one thing, and one or more things not contained within the first thing. Every act and every thought of every man has a motive; and this motive is invariably the desire to secure



a real or apparent benefit for himself or for other living beings. We need not here pause to ask ourselves if there is a distinction between the perception of a benefit to be secured and the will to secure it. For the moment it suffices to observe that every act of man and every thought leading to action seems to be either egoistic or altruistic.<sup>1</sup>

Egoism would then be the same egoism and altruism the same altruism in any activity, and the only difference between two activities would seem to lie in the material objects with which they have to do. Let us try to discover if this would necessarily be true, and to this end we may enquire into the destiny of egoism and altruism in another and equally conspicuous human concern — that of private property. As in the case of politics their destiny must be one of three:

(1) Egoism will triumph over and exterminate altruism; *i.e.* one man will gain possession of all the property there is, and no other man will own the smallest share in any part of it.

(2) Altruism will triumph over and exterminate egoism; *i.e.* the time will come when every man will own property exactly equal in amount and in nature to that owned by every other man.

<sup>1</sup> Those acts which we commonly speak of as partaking of both egoism and altruism need not receive a separate consideration, since they are all truly altruistic. True altruism aims at inducing altruism in others: it may not, then, manifest itself in acts by which the agent himself is allowed to go unbenefited.

For anything we know to the contrary either of these destinies is possible.

(3) At some time, past or future, will have been realised the greatest centralisation of wealth; and at some other time will have been realised the widest distribution of wealth; and through this arc will swing for ever the pendulum of "mine and thine."

If this last hypothesis be justified by the issue, and if we suppose the sum of human activities to equal the sum of the processes of acquisition and partition of property, it is clear that the destiny of this activity, as in the case of politics, would involve the dissolution of consciousness in men or in any legitimate successors of men. Or if the sum of human activities be supposed to include the business of politics as well, and indefinite oscillation be the destiny of egoism and altruism in both fields, the result would be the same. If men or their successors should escape the doom of their mother Earth, and considerations of property and politics should be extended throughout the universe; and if politicians and property-holders should multiply in proportion to this extended scope of their activities, it would still be impossible ultimately to avert the exhaustion of the resources of these two careers, unless it be supposed that these resources together with those who handle them be multiplied to infinity: a supposition which is obviously absurd in connexion with either property or politics, since

it would deny to any polity or piece of property any value whatsoever as a basis for action, discussion, or thought. Or, again, if we make the extreme, and highly improbable, supposition that from time to time all written and verbal records of the past be destroyed, the legacy of racial experience by heredity would eventually reduce the once novel impulses to action in either of these two fields to a paralysing monotony; and nothing but the material collapse of the universe could avert that similar calamity of a gradual dissolution of consciousness.

But wealth and power do not constitute the sum of human concerns, and we occasionally observe a man leading a full and varied life though giving but little attention to either. Let us, then, proceed to examine the rôles of egoism and altruism in those departments of human activity lying wholly or partially outside of politics and the distribution of material property.<sup>1</sup>

The pursuit of fame, when considered apart from the practice of an art for its own sake, presents an analogy so close to that of the pursuit of political power as to require no detailed review.

Again, the addiction to vices of the senses, arising as it always seems to do from an impulse to acquire an apparent superiority over others or over one's

<sup>1</sup> Again postponing consideration of our hypotheses (1) and (2).

normal self, presents a similar analogy and calls for no separate treatment here. A dream of love, wealth, or domination is doubtless the reason for them all; or if anyone should prefer to regard them as merely the relics of a more bestial past, he would expect them to be left out of a discussion of activities peculiarly human.

We may, then, proceed to consider a certain motive of men's actions which seems to show some distinguishing characteristics. This motive we may call love and define roughly as an emotional consideration which anybody may have for self, wife, child, friend, or all mankind. And love as a form of activity may be called the practical consequences of that emotional consideration, since no motive can exist without an act to follow, be it but the involuntary quiver of an eyelid or a thought unuttered.

With no desire especially to exclude them from consideration, we may nevertheless refrain from laying great stress on the so-called physical characteristics of love, since in sexual love and in love of progeny we differ so little from some of the lower animals that these activities possess but little interest in a discussion whose range is, for the moment, being purposely confined to the domain of activities peculiarly human. Obvious as is their importance as an evolutionary means to the end of life itself, they were more properly discussed in connexion

with the other processes of nature. We may here regard them simply as exerting a greater or lesser influence on that emotional consideration which results in acts of love in general.

Love is regarded as in the main altruistic; yet it is hardly necessary to observe that its whole existence seems to be made up of a conflict between altruism and egoism; the immediate realisation of perfect altruism being prevented by no other human influence than that self-love which we have conveniently divided into the categories of fear, hate, pride, self-indulgence, conceit, self-respect, etc. The perfect egoism of love would mean that everybody would love himself and nobody else, and would act accordingly in every way; for love, like politics, is intimately connected with all other human activities and in its manifestations the concrete is always involved. That is to say, the most refined abstractions of love, as manifested in praise, blame, or sympathy, admiration of mental gifts, or encouragement given to another to work for a moral principle, are all grounded solely upon objects capable of affecting our organs and nerves of sense or upon inferences directly derived from sense-impressions. These reflections on the manifestations of love are not essential to our main theme, but may serve to mitigate its character of abstractness. Nor is it necessary to assign a quantitative value to any particular love, egoistic or altruistic. In

any case it would depend upon a variety of circumstances, — the physical and mental characteristics of the lover, his position in life with regard to other activities, the comparative usefulness or futility of performing acts of love or of yearning to perform them, etc., — and how great would be that self-love which should embody the perfection of egoism, it is neither possible nor, for present purposes, desirable to know.

(1) The perfect egoism of love would mean, then, that everybody would love himself and nobody else, and would act accordingly in every way; and

(2) The perfect altruism of love would mean that everybody would love himself and everybody else equally, and would act accordingly in every way. While love existed, nobody might refrain from loving himself as well as others, for he must always suffer acts of love to be done to him; moreover, his love for others would prevent his desiring them to witness his martyrdom or to love one whom he loved not.

Either of the above destinies of the activity of love is conceivable and negatives nothing that we know.

(3) It is readily to be seen that the hypothesis of the indefinite oscillation of love between the extremes of egoism and altruism just short of the perfection of either would mean the eventual annihilation of love; or, if all other human activities had perished, it would mean the eventual dissolution

of human consciousness. In love, as in other activities, the vastly strengthened will or intelligence which must be a condition precedent to any near approach to the perfection of either egoism or altruism would be at least sufficient to deprive of interest any oscillation of love which might extend no farther in either of the only two possible directions. History and inexorable heredity must then do their work. The need to be inventive in love is already admitted by us all; but the most subtle refinements of affection and forethought would in time come to be regarded as no better than singing "Drink to me only with your eyes" or giving a brace of jewelled hearts. The effect of these or similar demonstrations upon any member of a generation having more varied traditions than our own and lacking the diversion of politics or of trade need not be dwelt on at length. Eventually no word could be said to one's beloved, no surprise prepared for him, which possessed for him the smallest interest. No pain could be spared him with which he was not already so familiar that to have suffered it would have been no pain at all but merely flat and futile death.

Thus in love, as in politics, though real or apparent oscillations through egoism and altruism may have already taken place, and though further oscillations be inevitable in the future, the net result of every

series of a sufficient number of oscillations must be an advance in the direction of either egoism or altruism, — that is, if love is to be acquitted of suicidal intent. Love, then, and politics and the rest, would seem to differ in their motions from a material pendulum, and the figure is perhaps indeed far-fetched, although we may have reason to doubt if the real motions of a pendulum are correctly described by its “laws.”

A word, now, as to another human activity which so nearly coincides with love that the two might quite well have formed the subject of a single inquiry. It comprises all those acts, whether in politics, trade, the life of the family, or any other phase of life, which may be considered according to ethical standards. Roughly speaking, morality is the altruism of it; immorality, the egoism. Should anyone care to draw distinctions, he may do so without in any way affecting the results of the enquiry. Hypothesis (3) as to the destiny of this activity would obviously lead to the same issue as in the case of all the other activities considered. For, as soon as the futility of all moral or immoral acts was clearly demonstrated, everybody would become unmoral. The perfection of immorality is conceivable as a state of society in which everybody would always endeavour to act in his own interest and not in the interest of anybody else. And the perfection of morality would mean that



everybody would always try to act in the interest of himself and all others equally.<sup>1</sup>

Let us now consider that department of human activity which may be called provisionally the practice of an art for its own sake. Politics, war, trade, love, and the rest are all arts which may conceivably be, and perhaps sometimes are, practised largely for their own sakes; and, on the other hand, it may be doubted if any of the mechanical or fine arts are ever practised *exclusively* for their own sakes. Our concern at present is with that phase of the practice of any art, be it politics, carpentry, or music, which is determined by the intrinsic interest possessed by that art for the practitioner.

For the purposes of this inquiry, the scope of the activity under consideration may be extended so as to include the pursuit of knowledge as well. We draw a convenient and practically necessary distinction between science and art which, however, cannot be sustained in either their evolutionary or

<sup>1</sup> Certain phases of the religious life are treated of in the text in the reviews of politics, love, and the pursuit of knowledge. That phase of it which is generally regarded as being determined exclusively by dogma is purposely omitted from consideration in the belief that the readers of this essay will agree that the influence of dogma upon human activities is no more a fundamental one than, say, the laws of nations. If, however, it were to be formally treated in the text, the results of such treatment are readily to be divined. In the eighth chapter will be found some ancient observations upon our fundamental love and fear of the supernatural which, I trust, will make clear the inutility of their receiving a separate treatment in this chapter.

their teleological aspect. Knowledge is new experience. The ancestors of a painter gained certain new experiences through their actions in going to live in a certain country, in letting their eyes rest on certain objects, in laying their hands to certain pieces of work; and the sum of these experiences together with the sum of his own constitute our painter's opportunity to paint, his ability and desire to paint, and his act of painting as well. His act of painting is itself new experience of precisely the same order as the entomologist's chance discovery of a new species. His aim in painting is again the same as the entomologist's or the pedagogue's or the philosopher's: to produce a new object of interest for his own or another's contemplation, or the copy of an old object which continues to provide new experience for himself or others. The combination of new experience to form still newer experience is seen in every stroke of the painter's brush, which is the resultant of, or the conclusion consciously or unconsciously drawn from, all the earlier strokes of his own brush and of other brushes whose products he has studied. In sum, though the work of each individual artist is different from that of every other artist and scientist, it is impossible to discover any but an apparent difference between the work of scientists as a class and that of artists as a class, their antecedents, their consummation, their aim, being precisely similar, and the only

distinction between them having been arbitrarily established by ourselves to compensate for our necessarily massive ignorance of the factors in any particular performance.

We may, then, define the activity under consideration as the acquirement of knowledge for its own sake: this to include the study of the arts and physical sciences, of history, philosophy, literature, etc., the teaching of all these branches of learning, as well as the practice of all arts, in the widest sense of the word "art," for the intrinsic interest which they possess. That such an activity is indeed human will, I think, be questioned by none. For, should we assume that no single piece of knowledge was ever of interest *exclusively* for its own sake, but that some consideration of wealth, fame, of a desired supremacy over another, or of the prolongation of life itself, was always in the mind of him who sought it, the end of such acquisition of wealth, fame, supremacy, or additional days of life, must still be new experience, and our assumption must by implication be discredited.

At the end of this stage of our investigation I think we may be satisfied that we have, in our review beginning with politics and ending with the pursuit of knowledge, ignored none of those activities which are peculiarly human.

Since we have found that all other activities seemed to consist in a conflict between egoism and altruism,

we might expect to find in the acquirement of knowledge a similar conflict which, however, fails to disclose itself at first glance. A more rigorous search, made in the belief that this conflict must lie somewhere subtly hidden, is equally unproductive.

May the musical virtuoso be more altruistic than egoistic when composing or performing for the love of music?

May he, on the other hand, be more egoistic than altruistic? I am unaware if any musician or other artist has ever withheld from his fellows any discovery or innovation of his own for reasons relating exclusively to the art itself. At all events, this could only have been done in the conviction that the secret would not die with its discoverer; for if the discoverer believed he was definitively withholding his new experience, his act of withholding would not be serving his interest in the art: in so far as the art was concerned there would have been no new experience whatever. An artist might, of course, withhold certain innovations in favour of other innovations, because of limitations of time or opportunity; but such an act, clearly, would not be artistically egoistic.

May he who abandons his study of higher mathematics in order to teach arithmetic be more altruistic than egoistic? Clearly not, if he does this for his interest in teaching arithmetic.

Try as we will, we can find no instance of the pur-

suit of knowledge for its own sake which reveals a conflict between egoism and altruism or even the slightest reason for the use of either of these terms in connexion with this activity.

This conclusion respecting the pursuit of knowledge seems at least as indisputable as any of those other conclusions arrived at in the course of this investigation. But what, then, of our other activities, politics, trade, and the rest? Can we doubt that they are really human activities or that there is a conflict in them, — a conflict which we defined as the mutual opposition of egoism and altruism and which we believed to be identical with the peculiarly human phase of each of them, the only difference between two activities lying in the material objects with which they had to do? Or is there, perhaps, no point of contact between politics, trade, and love, on the one hand, which consisted each in a conflict between egoism and altruism, and the pursuit of knowledge, on the other hand, with which neither egoism nor altruism had anything to do, unless such point of contact lie in those material circumstances which we have not yet had under consideration?

But we have already seen that knowledge played a very important part in all those other activities. Not only was it the principle of the unceasing pursuit of new experience that determined our sole conclusion of value respecting those activities, —

the conclusion that indefinite oscillation of them all through egoism and altruism would end in the dissolution of consciousness, — but no single statement of ours was in any part or all independent of this principle. Ambition, greed, jealousy, modesty, or the acts and thoughts resulting therefrom must be the present culmination of past new experience. In each ambitious act or modest thought the factors are the sum of the past experience of the actor or thinker and of a greater or lesser portion of the experience of all his ancestors. And these two factors, determined though they doubtless are by the sum of universal events, constitute a new experience — that is, an act or thought — which is different from anybody else's new experience.

Thus are we brought face to face with the fact that all our human activities, though they may seem to differ from one another in their ultimate or concrete subject-matter, are as thoroughly informed by the pursuit of knowledge as we had believed them to be by the conflict between egoism and altruism; and, since the only thing that humanity or mind can do immediately to matter is to know it, this last distinction between our activities disappears from view. . Furthermore, we know that our conflict between egoism and altruism cannot be identical with the pursuit of knowledge, for we have seen clearly enough that egoism and altruism have nothing to do with it. And, as we cannot in any way

get rid of this pursuit of knowledge or having of new experience, we are forced to conclude that the conflict between egoism and altruism does not exist in fact, but only in appearance; that no act or thought of man is egoistic or altruistic or both.

Whatever may be the value of this conclusion, so far as it goes, — whatever, indeed, may be the value, pragmatically considered, of that logic which has enabled us to reach it, — when we come to test it by the standard of applicability in particular instances we find, as was to be expected, that it receives the most complete and emphatic corroboration. Let us review and extend our earlier considerations of those activities which seemed to consist in a conflict between egoism and altruism.

“If the destiny of politics <sup>1</sup> is correctly described in (1), it is clear that their control will eventually devolve upon a single individual who will prescribe for all other men in every detail of those multifarious activities with which politics have to do.”

“If the destiny of politics is correctly described in (2), it is clear that their control will eventually devolve upon the mass of mankind taken together, of which every individual will have exactly the same degree of influence and exactly the same political opinions as every other.”

It will be seen that (2) is exactly equal to (1).

<sup>1</sup> Page 29.

For in (2), as in (1), there might be a vast number of variously hungry and thirsty men, of variously loving and hating men, but there would be but one political man, and this one would deal with all these various hungers and thirsts, loves and hates, in but one way, the way of the perfect politician. And to describe this man or his politics as either egoistic or altruistic would obviously be meaningless.

In the case of private property,<sup>1</sup> it will again be seen that the perfection of altruism would be tantamount to the perfection of egoism, since, in respect of property, there would be but one man who would own everything there was to be owned.

Without stopping to inquire what would become of private property and of politics in the hands of the perfect proprietor and of the perfect politician — and passing over the pursuit of fame and the addiction to vices of the senses as presenting no distinguishing features of interest — we shall find that in love<sup>2</sup> the same identification of perfect altruism with perfect egoism is inevitable. All men being exactly alike in respect of love, there would be but one lover and one beloved. And the same thing is as true of morality and immorality:<sup>3</sup> morality when absolutely pure becomes equivalent to pure immorality.

Having satisfied ourselves that the perfection of egoism and of altruism would be one and the same

<sup>1</sup> Page 41.

<sup>2</sup> Page 46.

<sup>3</sup> Page 48.



thing and that the state of human society embodying such perfection in all its activities might not therefore be called either egoistic or altruistic, we may ask ourselves if intermediate stages of activities might, nevertheless, reveal a real conflict between egoism and altruism. May we of to-day be performing really egoistic and altruistic acts? In sum, may either egoism or altruism be a means to the end of that perfection which embodies neither? The impossibility of an affirmative answer becomes clear when we remember that no end has ever been known but was itself a means: that no end is even conceivable which looks not to another end. So necessary a constituent of all thought is the conception of continuity in new experience that perfection itself can have no meaning for us unless it may be regarded as the means to something else. And if perfection could have no meaning, *all-but perfection* could not be a means to anything else, and so could have no meaning, nor *all-but all-but perfection*, and so on down to our imperfect selves who would then collapse in absurdity. I may labour a whole lifetime with a single end in view, only to find, when I have attained it, that it is a means. And if I had at any time tried to conceive it solely as an end without consequences, it is obvious that I could not have laboured for it. I may be at great pains to kill myself, with a view to getting out of this world, but not with a view to sleeping a dreamless sleep for ever, for that view I

cannot take, although I can mentally repeat the words and compare them with other traditional statements about the ends of things which have formed the nucleus of beliefs but have never corresponded to actual conceptions, — that is, to anything that may be maintained in thought. In a subsequent investigation we may attempt to seize the true significance of a belief in the ends of things. For present purposes, our knowledge that matter, if it has ever really died, has in all observed instances died in giving birth either to new matter or to something from which new matter may be formed; that the same continuity is always observed in form and is the very essence of thought: this knowledge would justify the inference that *all-but perfect egoism* could not die in giving birth to the perfection of something that is neither egoism nor its opposite, and in connexion with which either term is both actually and potentially irrelevant, even if we had not previously reached firm logical ground for denying to both egoism and altruism any part in human affairs save as appearances or convenient symbols of actual processes.

It is clear, then, that the sum of activities peculiarly human for any period or for all time must be identical with that process, within corresponding limits, which we have called the pursuit or acquirement of knowledge, the only means of pursuing knowledge being the acquirement of other knowledge. The

life of the human race, in other words, consists in the continuous reduction of the unknown by the knowing; in the ceaseless succession of new experiences, each experience constituting the sum of all earlier experiences. Each individual knower in this race of knowers is different from every other; each of his experiences is different from every other experience of his own or of any other. Thus, both knowers and known defy all classification save that one which embraces them all: every thought or act is new experience, and it can be nothing else; every thinker or actor gains new experience, and he can do nothing else.

Far from continuous appears this process to us of to-day having so much of the unknown before us, while we flounder clumsily in our distinctions between egoism and altruism, science and art, justice and injustice. Rather does it appear spasmodic and often exceedingly painful.

An occasional somebody, who does not believe that we are cousins of the fishes, but who is deeply impressed with the significance of some thousands of years of written records, denies that any such process exists, and tells us that we are doing exactly the same things we did over a hundred generations ago, and he is by no means thinking of new experience.

If I perceive an opportunity to deceive a foreigner and so to secure for my countrymen what everybody

calls a substantial practical advantage, am I certain to refrain from taking the necessary step because I recognise the impossibility of looking far enough into the immediate future to discover many of the practical consequences of my act, or because I recognise the theoretical necessity that whatever now appears to give my countrymen a practical advantage over foreigners cannot give them or me or anybody else any really practical advantage?

If I am being burned at the stake for having upheld a principle in which I believed, I am not likely to reflect that the act of my persecutors is of the same nature as my present experience. Suppose the principle I upheld to be, like all other principles, imperfect, in spite of which I have in a moment of exaltation seen far into the nature of things, I might then feel no hatred of my persecutors, I might die with a smile on my lips; yet I should probably be aware of the pain of burning.

If I am stronger than my neighbour and equally hungry, I may refrain from taking his loaf because I feel that to do so would be wrong. I may argue that I have no means of knowing if he has any right to that loaf; that I am in equal ignorance as to the consequences of my decision to society in general; that I am, on the contrary, well aware that the classification of acts as right and wrong does not apply to any single act whether it concern a loaf, a wife, or a battle, since any act may have consequences

which are in nature the opposite of the intention; that this classification is not even based upon probabilities making it applicable to the majority of cases, since the preponderance of consequences wholly unknown to its authors over those they guessed at is so vast that probability is not to be thought of in connexion with it; finally I may argue that it matters not the least whether I take the loaf or leave it, since in either case both I and my weaker neighbour shall gain new experience, and when we have gained enough of this, hunger will be but a name: and still I may leave him his loaf because of my innate and deep-seated feeling that to take it would be wrong.

Thus have the authors of these and other celebrated distinctions, ignorant though they were of probabilities, made society what it is to-day, and no other course was open to them; just as to us, ignorant also of probabilities but with more of past experience and less of future, no other course is open than gradually to replace these fading distinctions with conceptions better suited to our position in time.<sup>1</sup>

Enough has been said to indicate, so far as is possible with the means at our command, the nature of the relation of our practical life of to-day, in which we work largely if not entirely<sup>2</sup> with symbols, to that

<sup>1</sup> The will to conquer, die, live, or let live in the face of reasons for the contrary proceedings will be considered in two different aspects in Chapters IV and VII.

<sup>2</sup> It will be remembered that we have as yet barely touched upon the purely material side of life.

inner or basic process for which we are always trying to find improved symbols and which in its entirety in all time would constitute the sum or universe of human affairs; and we are now naturally led back to the query with which we began, What is the destiny of all our human activities or of that one process of gaining new experience which is seen to inform them all? It is now clear that this destiny must be one of two:

(1) or (2) — to follow the scheme of our earlier enquiries — The human race will culminate in a race of beings, or rather in one being, since the individuals would be identical with one another in every respect, who knows all that exists and has ever existed.

(3) The achievements of the human race will have approached at some period past or future to within a certain distance of omniscience — which distance may be any between the least we have as yet known and the span of a single new experience — beyond which no advance will ever be made.

To consider first the first-mentioned hypothesis: it is impossible to gain a very satisfactory idea of a being who had already attained to this perfection of knowledge or was approaching it in confidence; nevertheless, a few things may be said of him in general terms. Feeling no physical or mental want he may nevertheless know all the pains and pleasures, all the selfish and unselfish acts of all his predecessors, — of all those who go to make him up, — and he may know these events in perfect composure because he

understands them. He may pry without shame into all the shameful details of all our lives—that is, his life — because, again, he understands them. The sum of these and other similar performances constitutes an occupation whose real incentive is the derivative of that curiosity which, as we have seen, determines our actual quest of food, pleasures, honours. Our successor who is approaching perfection may live in a world that is ruined and in ashes, for he has the interest of all earlier worlds at his beck and call, even as we of to-day are fond of reconstructing, as far as possible, periods of earth-history in which we neither would nor could have lived. Whether he would be identical with his world is a question that will presently be raised: he would at all events know it thoroughly.

Perfection attained, what would he then do? For we cannot admit his perfection unless it be a means to something else.

Might he persist indefinitely in his perfection, passing from one to another of his retrospective surveys? If he be regarded as having absorbed, and so as containing within himself, all time, such persistence in perfection for more time is an obvious absurdity. If, on the other hand, his knowing be regarded as conditioned by time in the same way as our actions of to-day are regarded, — for, so far as we have as yet considered him, perfect knower though he is, he may nevertheless be limited, as by material

conditions, — it would still be inadmissible that he should give one moment of time to one review and the next to another, for at no time would he then embody perfection. Our conception of his perfection — crude though it is, yet possessing parental authority — demands that in that last moment of time which he absorbs, or in which he knows, he shall complete all his reviews.

If, then, he may not persist in perfection, might he conceivably retrace his steps? If so, he could not be our legitimate descendant nor have any connexion with an observed human or material universe in which no processes are reversible. Premises cannot follow upon conclusions, nor the child be born before its mother. Our perfect knower has absorbed everything humanly possible, including mental and verbal images of impossibilities. He may revive a mental picture more or less vivid of a dragon or a three-footed hen, but he may not maintain this picture if he carry it forward into a generation of minds to which the impossibility of such creatures is as patent as that of the blackness of white. His verbal image of the final and futile death of things or of the distinction between science and art would suffer the same fate. Thus he may, even as we do, trace conclusions to the premises, or the child to its mother, but he cannot contemplate conclusions developing into premises nor resolve himself into a race whose old men grow through middle age into childhood.



Might he destroy himself? But how could the sum of all experience become no experience, leading ever to no experience? It could not, then, have been all or even any experience. This alternative, beyond its verbal aspect, forms no subject of human thought; so let us by all means talk of three-footed hens if we like, but not of no experience.

What course, then, is open to our perfect knower? Clearly there is but one, and, though named last, this one was to be divined first. All experience is no sooner gained than it becomes what we may best call provisionally the least possible experience, this least possible experience being that of the inevitable change from all experience. The perfect knower having absorbed, at least in knowledge, all that is or has been, these all-things possible will persist, bearing mutual relations as different from perfection as possible when retrospectively considered, but as similar to perfection as possible when prospectively considered. The perfect knower existed solely by virtue of — *i.e.* his sole attribute was — perfect experience. He was therefore identical with the interrelation of this experience or its parts, and now becomes the least possible knower; and in this rearrangement of all that is, the least possible experience is gained indifferently by all that may become a knower in every possible degree or by all that may become mutually known in all possible relations.

This identification of the knower with his experience, though logically derivable from the foregoing considerations, is a necessity which may become somewhat more intelligible after we have taken more detailed account of the material processes involved. Meanwhile let us inquire if there are any emotional factors in the situation in which the perfect knower finds himself. Pleasure and pain, physical or moral, having been eliminated except as symbols through the understanding of the basic process, it seems inevitable that the perfect knower should contemplate his imminent metamorphosis in a spirit of perfect composure. The work of the universe is finished. What remains? That the work of the universe should begin. The perfect knower must be changed into something that lacks even the sense of an amoeba, but what else could he desire? That the universe should begin midway? But then all experience could not be gained; no, nor any. That his forefathers should be spared some of their suffering and tribulation? But nobody has ever known so well as he that they could then have nothing to call by the name of joy. He knows, furthermore, that by so much as any man has suffered above his fellows in life, will he be recompensed in the quality of his experience in the existence following his apparent death; that by so much of pain as another has escaped through the strength of his mind, his inherited health, the ability of his ancestors, or through any

combination of circumstances to which we give the name of chance, by so much does his progress belong to the past and by so much has the future less in store for him. We will not pause here to discuss qualitative differences in experience during life and after death. Since this subject may be more advantageously approached at a later stage of our investigation, we should be content in this connexion with observing that the transition of the perfect knower into the least possible knower would be nothing less, in current phrase, than a measure of self-preservation, and that this transition would be accomplished with a smoothness and absence of fuss in comparison with which the thorn in an actual finger works a veritable havoc.

To proceed now to the second and only other possible hypothesis as to human destiny — the hypothesis which corresponds to those earlier hypotheses, (3), of the oscillation of human activities through egoism and altruism:

“The achievements (page 62) of the human race will have approached at some period, past or future, to within a certain distance of omniscience, — which distance may be any between the least we have as yet known and the span of a single new experience, — beyond which no advance will ever be made.”

This hypothesis is obviously to be divided into two alternatives, of either of which we may form at least a verbal image.

(a) At some future time it will become evident that an insuperable barrier to further progress is formed by the intrinsic relation between knowing man and that mass of world-happenings which might conceivably form the subject of knowledge. No physical catastrophe will interfere with the indefinite progress of knowledge, but the nature of the knowable will be found to be such that it may not all be known. For example, a certain descendant of mine of a billion years hence, who has somehow managed to escape the doom of Earth, will nevertheless remain in ignorance of the daily life upon Earth of a certain ancestor of mine of a thousand years ago, because he has no means at his command of bringing this ancestor's doings to light; and at the same time he will have the most convincing reasons for belief that his own descendants of a billion years later will be equally ignorant on the same subject.

(b) Some physical catastrophe such as the gradual devolution<sup>1</sup> of the material universe with the consequent unavailability of any energy, will blot out the human race and everything else that may be the seat of consciousness before there is time to attain either perfect knowledge or the certainty that it is unattainable.

The obvious implication of (a), if it be agreed that

<sup>1</sup> Throughout these enquiries this term will be used in a general sense, as above, in preference to the more usual term "dissolution," which, as will later appear, would be out of keeping with the character of the investigation.

material phenomena may not indefinitely increase in variety, is the eventual dissolution of consciousness.

When we come to test the conceivability of this same hypothesis, (a), — *i.e.* its capability of being maintained in thought, — we find that certain considerations of the material world are at once involved. At the outset, then, let it be understood that we have not here to discuss the doctrine that the reality which manifests itself in mind is different from the reality which manifests itself in matter — that a thing cannot be aware of itself; hence it must be not-matter to which matter is presented. This contention is neither supported nor refuted directly by empirical evidence, although we shall see that certain empirical evidence has led to a conclusion which undermines the logical conceit on which alone it rests and on which recent generations have been unable to establish a conception possessing any practical or theoretical value. In any case, however, it would seem impossible to deny that thought is no more perishable than the impulses emanating from matter; that, as in the world of matter,

“Thou canst not touch a flower  
Without troubling of a star,”

so in the world of thought, the lightest whim, even though unexpressed, conditions both the thought and the material processes of its own time and of all

time to come. Inasmuch as the material processes, or the processes of which they form one manifestation, are the ulterior determinants of all thought whilst thoughts are the determinants of some material processes, and inasmuch as Nothing cannot be supposed to lie between mind and matter nor between any two portions of mind, or of matter, or of the ether, it must be concluded that the material processes never give an impulse to thought without receiving from it an impulse in return which extends throughout their universe and at once reacts throughout this universe and through thought itself. The effects of these impulses upon individual objects and individual minds vary in accordance with that past experience of each which has determined its chemical composition or its position with regard to other material objects, or its temperament in comparison with other minds or many another feature of its existence. Some of the resultants of these effects, such as motion, energy, gravity, or the content of an idea, we can measure without knowing in the least what they are. Of other resultant effects we are unconscious; but, apart from the theoretical necessity of the case, we have no hesitation in inferring their presence when we ask ourselves the following questions.

We are undoubtedly unconscious of some of the factors in all our sense-impressions and in all our inferences from them. What are these factors?

From the material processes and from the thought of others are undoubtedly derived certain effects which constitute those factors in our own sense-impressions and inferences of which we are indeed conscious; and at the same time certain other effects are derived which do not figure in our conscious thought. Is it likely that these last-named effects never reach us, but pass one knows not whither, whilst the factors in thought of which we are unconscious have arrived one knows not whence?

Now, it is a further theoretical necessity that each of these effects, whether of thought-process or of matter-process, instead of retaining the same value through all time, should gain in efficiency with each added moment of time, since any event at any moment of time would be determined by all the events of the preceding moment, each of which in turn would have been determined, amongst other things, by any particular earlier effect that we might name. The coefficient of the increase in efficiency of any given effect (or, more strictly, of the sum of effects directly derived from any given effect) per moment of time would, then, be the number of universal events per moment of time. Every simple or original effect would continue throughout all time to have the same efficiency at any given moment as any other effect. Any effects of which we may take account — *i.e.* any events — are, of course, exceedingly complex, — *i.e.* made up of many

effects, — and would vary in relative practical importance, but each one of them would, in the sum of its consequences, gain continuously in intrinsic influence while retaining its original degree of influence relatively to other effects. The necessity of this continuous gain in absolute efficiency without loss in relative efficiency will be seen not only in the foregoing considerations, but in the fact of evolution itself which could never have taken place in any form if all series of events were not continuously adding to their modifying influence upon one another.

Instances of the operation of this principle of accumulation are to be met with everywhere in nature as well as in the life of ideas; and nowhere is an instance to be found of an opposite or different process. A seed falling upon fallow ground, no matter whence, is an event — or culmination of many effects — possessing universal implications; *i.e.* it is one of the determinants of all subsequent events, and all the consequences of this event react upon one another. Now, this falling of a seed may well be the condition precedent to the peopling of an island within a certain time. The island populated bears a vastly different relation to the neighbouring continent, to the Earth as a whole, and to everything outside the Earth, from the island uninhabited. The immediate effects of the falling of the seed, though just as far-reaching, were by no means so varied or intense — in other words, so efficient for the immediate



further modification of events — as this one amongst many resultant effects. Instances of this continued gain in efficiency, both in the material processes and in the life of ideas, are so common and obvious — at all events, where the process called devolution is not going on, and this process was, by the terms of the subdivision (a) of our hypothesis, left out of account — that no others need here be cited.

One phase of the process of accumulation is summarised in general terms in the formula of a certain phase of evolution. The disappearance of a species testifies to the increased diversity of general terrestrial or of cosmical processes for participation in which the species in question is debarred by reason of some incident or incidents of its past experience. Similarly, a family or separate race of men, though gaining ever new experience, may disappear as such because of some peculiarity of their intermediate ancestors, such as physical inferiority or social rebelliousness, which led them to go into another country or otherwise to provide for their descendants an environment in which they would, to some extent, be isolated from certain influences making for the survival, for the time being, of the common run of other branches of the human family. Though these descendants completely disappear as a race or family, it is always their cousins who persist, generally with increased advantages, even as every extinct species of plant and animal has its persistent avuncular rep-

representative upon Earth, carrying somewhere within it the record of the exterminating influence. In another investigation, a more than merely verbal analogy may occur to us between organic evolution and inorganic devolution.

A single concrete instance will suffice to indicate the bearing of this principle of accumulation on the hypothesis (*a*) that perfect knowledge may never be attained because the nature of the knowable will be found to be such that it may not all be known. Suppose a certain ancestor of mine on this day just a thousand years ago to have conceived the idea that he had better confess to a priest. His wife, observing the flutter of one of his eyelids, guesses what has passed through his mind, and makes her plans accordingly. This idea of my ancestor's is of course the resultant of all earlier effects, but may here be treated as if it were a simple effect. By it the men and women of the time will have been affected in various wise according to the present culmination of the past experience of each of them. To most of them its effect will swell that already prodigious preponderance of processes going on within them and without which they are unable consciously to separate into their component parts — of which they are, as we say, unaware, although each determinant of these processes colours each of their sense-impressions of the moment. They could do some separating, those men of a thousand years ago. They

separated hunger from thirst, love from hate; but an effect that did not jog some such instinct or a memory or give rise to an actual sense-impression produced in them no result measurable by themselves or by their fellows; in other words, only those effects, or rather combinations of effects, which were on a very large scale and had originated in suitable places, could form subjects of their conscious thought. The falling of a stone or the warmth of the sun's rays or the power of the church in their immediate neighbourhood they could take account of, but the vibration of an atom on the other side of the Earth was apparently lost upon them. Nevertheless, if  $x$  represent the sum of effects immediately produced by my ancestor's thought, something like  $(x^x)$  will be the sum in the next moment of time, and something like  $(x^x) x^x$  will be the sum in the third moment, each of these effects retaining the same value absolutely, and the sum of them retaining the same value relatively to other effects, that the original effect had in the beginning.

As for myself, a thousand years later, I can tell you no more about my ancestor and his penitence than any contemporary of his living on the other side of the Earth could have told. If his penitence became famous, a neighbour of mine may even now be reading of it in a book without, however, being able the better to unravel the effect of it upon his own life. Indeed, the point scored over me in know-

ledge by my neighbour is hardly worth mentioning; since, if the penitence in question ever comes to be well understood, it will undoubtedly be found to have differed so widely from the written account of it that the book will not be thought of as an authority.

I am by no means disposed to infer from our thousand years of added experience that I and my neighbour of to-day are necessarily more successful unravellers of the processes culminating in ourselves and our age than were many contemporaries of my penitent ancestor. It is an evolutionary necessity, which is far from being denied in the written history of our race, that a group of knowers or thinkers should now and then arise who, from force of circumstances, might not hand down to their immediate successors their mental endowments unimpaired and unhampered, and who must so remain unexcelled for long generations.

Let us compare the practical aspect of this proposition with its theoretical aspect.

Practically, the conditions which make possible the thought of a group of great thinkers cannot be prolonged for more than a very few generations of men — are often not prolonged beyond the span of a single generation. Not only must an intellectual reaction supervene when it becomes clear that emulation of the great thinkers can result in but little, if any, advance, but the development of material needs always creates a diversion sooner or later.

Thus the son of a poet may be forced or tempted into the pursuit of trade or of war, for either of which he may by heredity be unfit. Again, the effect of a great thinker's single-handed contest with the unknown may be disastrous to the nerves and bodily health of his offspring.

It will be observed that we are here speaking of "great thinkers" in the traditional, which is also the evolutionary but not necessarily the teleological, signification of the term; *i.e.* we are judging them by the palpable effects of their activity upon the evolutionary process. For it is our way to overlook the foolish words and deeds of a man who has performed some useful work; but when in his son we find one who not only says and does foolish things but fails to say or do anything useful, we cannot waste time asking ourselves if this one is perhaps really a higher embodiment of humanity than his father. We are in complete ignorance of much the greatest part of what either he or his father embodies, but we know at least that the son may indeed be a blockhead and incapable of any greater contribution to progress than a cow's. So we generally turn him our backs, and properly enough, for this attitude is justified by the ethical consideration that it is unsafe to make as much of a blockhead as of a sage.

But, theoretically, we know that everything that was present in the father must be present in the son and with accumulated force — and not only

everything that was present in his own father but everything, as well, that was present in everybody else's father. And from this ultra-evolutionary necessity we conclude that heredity belongs exclusively to the evolutionary process and is not applicable for all time. The son inherits from the father certain characteristics, as grey eyes or a tendency to say foolish things, which are apprehensible during that period of universe-history, or a part of it, to which the principle of evolution may apply. By far the greater part of his universal heritage is not to be consciously perceived by us human beings living in the evolutionary period because the time is not yet ripe; because we have not yet acquired ultra-evolutionary experience in sufficient fulness or variety. The portion of ultra-evolutionary experience which we have already acquired in considerable fulness and variety is that portion of it which has resulted in the subject of all evolutionary considerations: to wit, matter. And upon matter depends heredity; for the existence of matter was a condition precedent to the existence of distances between places. Thus the son inherits from the father locally or materially, because the distribution of matter in places — or of matter *and* places — has made it possible that a son should issue from a father bearing some of his local characteristics.

All our acts furnish an analogy to the case of heredity. If I fire a pistol, the ensuing material distur-

bance is less on the other side of the Earth than it is in my immediate neighbourhood, whilst the total effect is the same there as here. With regard to the whole life of any son, before and after death, the importance of his locally inherited characteristics must be trivial indeed as compared with those transmundane vibrations of my pistol shot.

Until within a very few years men have been concerned almost exclusively with matter — with matter, be it understood, in the widest sense of the term; *i.e.* with matter itself, its motions, the immaterial impulses set up by these motions, the sense impressions arising from these impulses in suitably organised living things, the inevitable inferences derived from the remembrance and comparison of these impressions. But the recent discovery that the atoms of matter are the resultants of processes some of which, at least, are immaterial has given an experimental interest to considerations which had hitherto lain wholly within the realm of theory. Experiments are slow and painful; sometimes the conclusions drawn from them constitute the most retrograde and worthless of all theory; but they are nevertheless the obvious and necessary adjuncts of all theory: no theory being possible that is not founded on experiments; no experiments being possible without at least some tiny shred of theory. Now, at all events, theory and experiment are embarked together on a voyage into the immaterial

in the course of which, though they may lose their first sailing master, evolution will eventually be left astern and remembered only as a local current in the ocean of appearances.

To return, now, to the problem of my penitent ancestor: it would be difficult to say what was the evolutionary value of my position for understanding him, as compared with those of his contemporaries. Perhaps my absorption of a larger number of the material effects of his penitence, though adequate to produce considerable evolutionary modifications in our stock, would not, so far as potential knowledge is concerned, make up for the considerable local difference between our respective surroundings, since in evolutionary problems differences in time often seem equivalent to distances in space. I should then be no nearer to understanding him than were his contemporaries. And it is certain that the indefinitely prolonged accumulation of strictly evolutionary effects could never bring me nor anybody else to a perfect understanding of him, it being inconceivable that matter should eventually absorb all that which is now not-matter.

But the ultra-evolutionary advantage of my position is obvious enough. My descendant of a billion years hence will be in a still better position. And if sufficient time was granted, — and there was no restriction as to time by its terms, — the worthlessness of the hypothesis (*a*) under consideration would



be practically demonstrated; the knowable would be seen to contain no element of unknowableness; and to some far-off descendant, or rather successor, of mine would be brought home, in all possible relations, the penitence of my ancestor of a thousand years ago whose own understanding of his thought would, by comparison, be meagre.

What we now call knowledge or thought, investing it with a certain competence to deal with ultra-evolutionary possibilities, is of course evolutionary in character,<sup>1</sup> and will eventually be unseated as its material constituents dwindle and vanish. It is, however, one resultant of processes which ultimately are exclusively ultra-evolutionary. Its successor will be another such resultant, subject to different conditions and more complex and competent in proportion to the difference in time. To use another figure, knowledge will be understood in these pages as the whole knowing family, of which our terrestrial and any other evolutionary knowledge represent a single generation.

The hypothesis (*a*), then, is out of the question, and the destiny of human activities, or of the general process of gaining new experience, must be one of two.

(1) or (2) — Perfect knowledge will be attained.

(3), (*b*), (page 68) — Some physical catastrophe

<sup>1</sup> Cf. Chapter VI.

will blot out the human race and everything else that may be the seat of consciousness before there is time to attain this perfect knowledge.

The first-named is conceivable, and some of its implications have already been reviewed.

Upon the last-named, as upon its alternative (*a*), the bearing of certain considerations already entertained is sufficiently clear, these considerations being

The impossibility of no experience.

The impossibility, in a universe to only one phase of whose processes the principle of evolution can apply, — and then only in the character of a convenient symbol invented by beings themselves evolutionary, — that universal devolution should ever take place.

As I have stated in the preface, the investigation recorded in this chapter is not to be carried into the material world in its loneliness — *i.e.* as it may appear to exist or have existed apart from knowing man. This is reserved for the next chapter.

The results of the investigation just completed should, I think, be sufficiently clear. The knowing and their knowledge are Change; the subject-matter of knowledge — which is ultimately the same thing as knowledge itself — is illusion. One illusion replaces another in that order which will be recognised by omniscience, or the sum of illusions, to have been determined by reality or the impossible.

The necessity of the finitude of knowledge and its subject-matter has already been stated a number of times. *How* it may be finite has also been stated in general terms. In the next chapter will be undertaken a more particular account of the manner of this finitude.

## CHAPTER III

### THE FICTION OF A UNIVERSE

No apology seems necessary for the symbols or the treatment of them set forth in this chapter. The philosopher may accept, nay demand, a unit of space and a unit of time, furthermore a unit of substance in motion; but when he attempts to treat of these unknown existences with a view to deriving from them the apparent universe, he soon finds that the sciences of physics and mathematics are inadequate to the task. Yet, though he be prepared to admit that these sciences have perhaps no ultimate value but are useful only in describing matter as it affects the five senses of man, he is nevertheless forced to work, if at all, with symbols which are to some extent susceptible of physical and mathematical treatment, since everything contained in his perceptual experience is susceptible of such treatment, and anything not so contained could not be defined in the terms of language. Only in such wise, by indirection, may he hope to come to any comprehension of that which he cannot directly refer to anything contained in his experience.

These considerations will so often reappear in the

course of this chapter that further definition of them may for the moment be dispensed with.

Nor have I thought I need discuss at length a question which has been so often discussed before and always with the same result: to wit, the influence upon our daily lives of the intrusion of such fundamental questions as, What is the universe? The well-known protest, "When so many needs are pressing, why should I bother my head with considerations so remote?" meets with the inevitable reply, "But you can't help bothering your head with them." That "man is a born metaphysician" and that the most obvious of all questions is, "Whence this great world?" has been recognised by the cultivated and by the savage of all times of which we have knowledge. Men put the question from them or eagerly attack it with varying persistence and satisfaction. If the standard of achievement be the highest practical efficiency of an individual life that terminates with death, its repeated intrusion is often not a help but a hindrance; if the standard of achievement be the progress of a race, the relatively successful evasion of it is without positive significance and, as a practice, is doubtless foredoomed to desuetude.

Trusting, then, that the reader has already been convinced by my notable predecessors of my right, or any other's, to attack the problem of the universe and to begin either with particular appearances or

with general principles, I shall endeavour to point out what I believe to be at present the most promising line of attack as well as the most obvious conditions of any attack conducted along this line.

Certain assumptions in respect of the universe are frequently made — and by universe will be understood the sum of all things known and unknown — which are capable of disproof by any who will put to themselves any one of a number of different series of obvious questions. But to most of us nothing is more abhorrent than an obvious question. For the more obvious it is, the more swiftly does it come into a conflict of implications with an obvious fact. The tumult that ensues is indescribable, and generally a moral is drawn from it.

In the enquiry here to be undertaken the implications of these ill-starred postulates will not be reviewed in detail: such a review would contain nothing essential beyond the considerations presented in the earlier chapters. The postulates themselves will be mentioned together with some of the obvious reasons for rejecting them; and the only remaining postulate that has ever been heard of will then be set up as a subject of discussion. This remaining postulate is a wayward kind of creature somewhat difficult to confine within the terms of language. Nevertheless, its implications may be maintained in thought and in verbal discussion; and the purpose

of this enquiry is to discover, if possible, how they may work out practically.

Infinity of space and time is an assumption which not only leads to nothing satisfactory but involves us in contradictions at the very outset. Since space and time are apparent conditions of all known actions, it seems impossible to assert that they must remain in the sum for ever unknowable without in the same breath renouncing the right to make any assertion or guess about them, positive or negative.

But is an assumption of finitude, such as we associate with the objects of common experience, more feasible? If we assert that the universe is one day to be destroyed even as a soap bubble at a touch of the hand, how can we attribute any significance to time as a whole or to that day of destruction in particular? In respect of space, a finite universe is generally conceived as having a geometrical form. The surrounding Nothing must, then, have a boundary or outline. But an attribute so definite as outline seems impossible to predicate of Nothing, for how shall we believe that anything may have an apparent outline if Nothing may have a real one?

The only issue from this dilemma seems to lie in the assumption of a universe in which, on the one hand, new space and new time are not indefinitely realisable, whilst, on the other hand, it may never have had beginning nor end nor geometrical form.

Now, I trust I shall not be thought improperly facetious if I observe that this problem of the universe is one to be approached with a feeling of great respect. At all events, my appeal is made seriously, and I regard it as by no means superfluous. For I have remarked in many people (final-causationists amongst them) who pretend to an interest in fundamental questions a pronounced tendency to accept provisionally such explanations of the universe and of matter as are most readily comprehensible with reference to objects of common experience. But human science is already in a position to aver that it is just such explanations as are most concretely comprehensible that may to best advantage be rejected — and rejected not provisionally but finally.

Faith in the competence of our five senses to apprehend any portion of ultimate reality has perforce been gradually abjured by those who would gain some understanding of the constitution of matter. It is an attitude at once more humble and more energetic that has been productive of our knowledge that the units of which matter is composed, whatever they may really be, do at least bear utterly no resemblance to matter as apprehended in the objects of common experience; that, though there must be a correspondence between the various apparent forms of matter and the atoms of which they are composed, the idea of resemblance — with reference to our sense-perceptions — is not to be



thought of in connexion with this relation, since none of these atoms have ever been, nor could ever be, perceived by any of our senses. The competent investigator is not discouraged by the fact that a drawing or model of an atom cannot now nor ever will be made. He knows a good deal about the atom, may represent it partially in thought: it is an old friend. But one who looks at matter exclusively from the view-point of immediate concerns — one who regards his five senses as presumably more than merely ephemeral and theoretically clumsy implements of knowledge — is *ipso facto* incapable of adding to our present knowledge of the constitution of matter.

What has been demonstrated of the relation of our sense-perceptions to the constitution of matter seems inevitably true of their relation to the basic problem, the nature of the ultra-material universe. From whatever point of view we approach this problem we become conscious, sooner or later, of an inability to conceive the universe or its cause as having a geometrical form, which is the only kind of form contained in our experience. We must, then, ask ourselves, Is any conception of the universe possible at the present time which, though failing of correspondence to any sense-perception, may nevertheless be maintained in thought? And in response it would seem that recourse must be had to the now familiar hypothesis of a measurable

space or universe of dimensions other than three in number.<sup>1</sup>

At first glance this hypothesis has a promising look. The very fact that I can gain no idea of what an ungeometrical universe would look like, no matter how severely I strain my geometrical imagination, is a point in its favour. If it had a shape, I should know it could not be real; and whatever it may indeed be like, I know that the most meagre conception I may gain of it must be forced upon me against most of my strongest habits of thought. For the book of the universe is not waiting to be suddenly flung open by the hand of genius and read off to us in a day or in a thousand years. It is to be learned painfully, correction following upon inference, word after reluctant word being wrested from long pages of meaningless characters.

Whether, according to the hypothesis that I am considering, I assume space to have four dimensions or six or a multitude or only one, is of little moment at the outset of my enquiry, since I cannot refer any of these assumptions to an accomplished sense-impression. The points of immediate importance about

<sup>1</sup> I am not conversant with the mass of astronomical evidence tending to show that space may be ungeometrical, nor would I in any case undertake to handle such evidence. Moreover, I wish to bring first under consideration not the possibility that space may be demonstrated ungeometrical, but some of the implications of a universe in which it is assumed that space is ungeometrical.

this supposed universe are that it has no surface and no centre; that it contains a definite amount of space; that in it any two bodies which, after meeting and separating, move persistently in such a way as to get as far away as possible from the place of meeting, will eventually meet again; that in it our geometrical conceptions, if they are to be evolved<sup>1</sup> at all, must be the resultants of ungeometrical processes. For the convenience of having a name, I will call this the universe of one dimension.

Now, if I assume time to be a definite, knowable reality, — no matter, for the moment, whether independent, nor what its duration may be, — and if I further assume the universe of one dimension to be entirely filled with (*i.e.* to consist of) a continuous, homogeneous substance such as we may conceive the ether to be, I find at once that a number of things may be said about such a universe. Instead of seeing predications and inferences developing rapidly into absurdities, as in the case of a geometrical or of an infinite universe, I find that I can proceed some distance with the one-dimension universe without encountering any serious danger. I propose now to enquire what would seem to be thus logically predicable of such a universe.

I assume, then, that *there existed at a certain time*

<sup>1</sup> In this chapter the words "evolve" and "evolution" are obviously used in their widest sense, without reference to any specific doctrine of evolution.

*in the past a universe which, as a whole or in any part, was devoid of geometrical form and which consisted of a measurable amount of a continuous, homogeneous substance.*

Though this postulate may prove to contain within itself the necessity of modification of its own terms, I can at least promise that throughout the ensuing discussion nothing will be assumed further than is comprehended within these terms.

If the assumed universe-substance — which we may conveniently call the *cosmon* — is measurable, we may treat it as consisting of a definite number of its ultimate units, or *cosmoids*, which are likewise the units of space, all space being filled with the *cosmon*.

Similarly, if the *cosmon* is continuous, each *cosmoid* forms a part of a definite number of continuous lines of *cosmoids* — *cosmic lines* or *cosmic diameters* — passing through all other *cosmoids* and returning to the original *cosmoid*. In no case could a *cosmic line* pass between two *cosmoids*, embracing parts of each, — as it would appear to do in any geometrically graphic representation, — because the *cosmoids* are

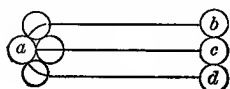


Fig. 1

of necessity indivisible. In the diagram (Fig. 1) let the *cosmoid* *c* be adjacent to both *b* and *d*, and let the *cosmic lines*, or sections of *cosmic diameters*, *ab*, *ac*, and *ad*, contain the same number of *cosmoids*. One *cosmoid* in each

line will, then, be adjacent to  $a$ , and another will be adjacent to  $b$ ,  $c$ , and  $d$  respectively.

In a continuous cosmon having no surface and no centre it is not conceivable that any two cosmic diameters should have unequal lengths. Such inequality would at once give to our universe a geometrical character; it would further imply that one cosmoid might be connected by its lines of adjacency with more cosmoids than might one of its fellows. But according to our assumption, each cosmoid must be connected with every other cosmoid; hence all cosmic diameters must contain the same number of cosmoids.

If, then, we represent by  $U$  the number of cosmoids in the universe, and by  $D$  the number of cosmoids contained in a cosmic diameter, it follows that

$\frac{U}{D}$  equals the number of cosmic lines meeting in each cosmoid, and that  $\frac{2U}{D}$  equals the number of cosmoids adjacent to each cosmoid.

It will be seen that the intersection of cosmic lines forms something different from a geometrical angle; since, if prolonged far enough in either direction, the lines will meet again. Moreover, they neither diverge nor converge, but are always the same number of cosmoids distant from one another save in the cosmoid which they have in common.

We have spoken of the cosmoids as differing from

one another, not as being identical in such a way as to make of the universe one cosmoid. Yet they cannot differ in constitution, since the cosmon is homogeneous; nor in size, since each of them is the smallest portion of a measurable universe. Consequently they cannot differ in mass nor in weight nor in any of the peculiar attributes of matter. Clearly, then, they may differ only in position. And it might reasonably be doubted if units so exactly alike and constituting the sum of all things could differ even in position, were it not for a further obvious consideration.

The cosmoids, to exist, must be doing something. Not only is it matter of certain knowledge that everything contained in our experience, whether matter, ether, or mind, is in a state of ceaseless agitation, but it is impossible even to assume anything to be in a state of rest without soon becoming aware that its assumed reality is vanishing. Eventually it disappears from consciousness, destroying our belief in its former existence. Thus, though we can assume a moving, ungeometrical universe which corresponds to nothing that we have ever perceived, and maintain it in imperfect contemplation, believing that it may possibly evolve our familiar geometrical conceptions, any unmoving universe, geometrical or ungeometrical, that we may assume, will speedily fade from our consciousness and end with denying either its own existence or the competence of all

human judgments, however partial. Since the existence of an unknowable and extra-universal mind such as, in realising a state of rest, would inevitably repudiate all connexion with men and things, is a conception which cannot be maintained in the minds of these same men otherwise than verbally, we may proceed in the conviction that the existence of anything which concerns men in any way, however remotely, implies its motion. And in the case of our assumed cosmon, any cosmoid that remained for any length of time at rest could not be regarded as existing, nor could any of the other cosmoids, which are exactly like this one in every respect save that one which depends upon their motion, be so regarded. If, then, our cosmoids exist, they must all be in motion and must continue in motion so long as they continue to exist. Position thus becomes intelligible as the attribute possessed by each cosmoid in virtue both of its own motion and of the motion of every other cosmoid.

We are now confronted with the question, Of what kinds of motion are the cosmoids capable? We have seen that they differ from one another only in respect of position, and it was with reference to their positions that we represented them by the letters *a*, *b*, *c*, etc. The necessary persistence of their movements means that each cosmoid will have a career different from that of every other cosmoid. But in what can their careers consist? They cannot sub-

divide nor increase in size nor alter their constitution. Can they rotate upon their axes? Even supposing that the smallest possible thing could have an axis with two poles, an indefinitely prolonged rotation of all these units would ultimately amount to a state of rest. Can they vibrate after the manner of an elastic sphere or ring? Obviously there is no room in the one-dimension universe for such vibration which again would be deprived of reality by the levelling hand of time. Can they combine? Closer combination than already exists in a continuous substance is not to be thought of. Clearly there is but one kind of motion possible for them, and that is change of position.

Time, according to our assumption, is a measurable reality composed of units which we may here call *kinemas*, or, successively,  $K\ 1$ ,  $K\ 2$ ,  $K\ 3$ , etc.,  $K\ 1$  being that moment of time at which we have chosen to begin our consideration of the one-dimension universe. The kinema is, then, that portion of time in which the least of events may take place; and in the case of the cosmon the least possible event is the movement of  $U$  cosmoids a distance of one cosmoid. Whatever may be the total duration of time, it is at all events certain that in each kinema every cosmoid would move a distance of one cosmoid.

We have not treated the cosmoids at the time of which we are speaking as having had any earlier career or as being endowed with any other attribute



than the essential necessity to move. We must therefore believe that their earliest motions will be of the simplest character; for it is hardly supposable that cosmoids utterly lacking in experience of a world such as we live in should set out to imitate in their motions the forms with which we are familiar in nature, — a leaf, a cloud, a curve, or a straight line. What there may be in an ungeometrical universe simpler than motion in a curve or in a straight line could not, of course, be referred to any actual perception; but if we consider some conceivable motions of cosmoids in the earlier kinemas, we may be able to represent some of the simple ones in thought. In our first consideration of cosmic motions we need not approach the question of the ultimate nature of the cosmoid, — which will soon be forced upon us, — but may proceed strictly upon our assumption that the cosmoid is the imperishable smallest portion of the universe-substance.

In *K 1* — no matter how, for the moment — let six cosmoids come into adjacent positions in a cosmic line, as shown in Figure 2; and in *K 2* let them take new positions, as in Figure 3. If in *K 3*, having each  $\frac{2}{D} U$  cosmoids for neighbours, they go back to their old positions of Figure 2, and the cosmoids of adjacent cosmic lines do likewise, they are assuredly not real cosmoids. We can no more conceive of the continued existence of a universe

in which took place an indefinite oscillation of its units, as shown in Figures 2 and 3, than we could

*e*      *c*      *a*      *b*      *d*      *f*

Fig. 2

*c*      *e*      *b*      *a*      *f*      *d*

Fig. 3

*c*      ⊗      *b*      *e*      *f*      *a*      ⊗      *d*

Fig. 4

ourselves continue to exist if the sum of our experience was the contemplation of a blank wall with a spot on it. If the cosmoid *a* exists only by virtue of its ability to change its position, it cannot, having once experienced a change with *b*, change back again, thus showing a contradictory tendency towards what is ultimately equivalent to a state of rest. If a cosmoid exists, it makes a change of position; if it still exists, its next move will not be the move of all moves most likely to destroy the significance of its previous move and so to disprove its own existence, but rather the move of all moves least likely ultimately to have this result. In *K 3*, the most obvious second move of each cosmoid would seem to be in the same cosmic line as its first move, and

to a position as far removed as possible from its position of the first kinema. Not that a cosmoid is supposed to have what we call the property of inertia, nor the power nor the need to explain the exigencies of its situation. Being a cosmoid, it is essentially able and prone to shun a neighbour of which it has had recent experience. Thus, if Figures 2 and 3 represent a portion of the happenings of  $K2$ , the cosmoids taking part in them will in  $K3$  take new positions, as shown in Figure 4; and in succeeding kinemas will continue in the same cosmic line. At the end of  $\frac{D}{2} - 1$  kinemas all the cosmoids of this line

would find themselves confronted by their earliest associates in the manner indicated in Figure 5. If  $c$  and  $d$  then changed places with  $a$  and  $b$ , respectively, they would be inaugurating



Fig. 5

a cosmical revolution of which every kinema would be equivalent to the corresponding kinema of the oscillation supposed in connexion with Figures 2 and 3, and which in its entirety would amount to a state of rest. In the next kinema, each cosmoid would, then, move into one of the  $\frac{U}{D} - 1$  new cosmic lines that lay open to it; and, after this first deviation, might conceivably continue in the new cosmic line for the most part, if not all, of  $\frac{D}{2}$  kinemas.

Motion in cosmic lines seems, then, to be the first and simplest motion in a universe of which the units possess but the one property, if we may call it such, of motion, and in which the only motion possible is change of relative positions. In such wise we may conceive them proceeding on their several journeys, only now and then being forced to turn aside from the simple course. The world is young, and there is an immense field to be explored by these restless spirits. We may call them free rovers; for, even though we may believe their roving to be limited by their nature in all respects, as we have already seen it to be in some respects, the fact that we are in absolute darkness as to the happenings of any single kinema gives an appearance of freedom to the choice of one amongst a vast number of what look to be equally feasible actions; and we may therefore speak of their roving as free until such time as we may find them face to face with an obvious limitation, even as we speak of our own motions as free until we are confronted with an obvious limitation such as hunger or an unscalable wall or an unfordable stream. For example, given a cosmoid situated as is *c* in Figure 5 with a recently used cosmoid *d* directly behind it and a less recently used cosmoid *a* directly in front of it; any attempt on our part to ascertain the exact nature of *c*'s next move would obviously be futile. The property of motion possessed by *c* may be spoken of

as an ability to profit by experience; without this ability, that first move in *K 2* — whether really its first move or not — would have been impossible. Then *c* would, in the position represented in Figure 5, shun both *d* and *a*, taking a position in a new cosmic line which would be distant from *d* and *a*, respectively, in proportion to the relative degrees of menace to *c*'s existence represented, according to *c*'s experience, by the proximity of these two familiar cosmoids. If we suppose this situation to have arisen at a much later period in *c*'s life than  $\frac{D}{2}$  kinemas from *K 1*, *c* would meanwhile have had the frequent experience that a less recently used cosmoid brings with it a more congenial following than a more recently used cosmoid. Then *c* would take a position more distant from *d* than from *a*; and its new position would be determined by its experience of the relative degrees of recentness of its alliances with *d* and with *a*.

The question of the cosmoid's real nature now forces itself upon our consideration. If *c* were a human brain, its memory would doubtless be quite inadequate as a basis for so nice discriminations as we have supposed it to exercise. But *c*, by assumption, is not a humanly knowing creature; and its so-called ability to profit by experience and to distinguish between cosmoids exactly alike in size, shape, and constitution is a manner of speaking

which may indeed be found useful in the course of this enquiry, but only after a more rigorous definition has been attempted of the sole and essential property of the cosmoid.

If  $c$  and  $a$  were spheres or cubes or portions of a straight line, the supposition of their mutual recognition and avoidance would be of no value even as a symbolical representation of their real performance. But, instead of any of these things, each of them in  $K1$  became a portion of a certain line containing  $D$  cosmoids and having no beginning and no end. This being the case, it is obvious that

all the  $\frac{2U}{D}$  cosmoids adjacent to  $c$  occupied different

positions with reference both to  $c$  and to one another. And no cosmoid adjacent to  $a$  could occupy the same position with reference to  $a$  that any cosmoid occupied with reference to  $c$ . Hence all cosmoids in the line in question occupied different positions with reference to  $c$  and to one another by virtue of their differences with reference to the adjacent

cosmoids. But there are  $\frac{U}{D}$  cosmic lines of which

$c$  is a portion, and these  $\frac{U}{D}$  lines contain all the cos-

mooids of the universe. Thus every cosmoid differs in position from every other cosmoid, not as we conceive position geometrically with reference always to some fixed object, but with reference both to its

own motion and to the motion of every other cosmoid. This means that no cosmoid can ever occupy the same position that another cosmoid has occupied; and that no cosmoid can ever again occupy a position that it has abandoned until itself and every other cosmoid in the universe have returned to the positions they occupied immediately before its occupation of the position in question. For example, *c* cannot again occupy its position of *K 1* until itself and all other cosmoids have returned to the positions they occupied before *K 1*.

Let us consider this aspect of the career of *c* travelling, as we have chosen to say, in its original cosmic line. This cosmic line, as we have seen, existed of necessity; but that any cosmoid should actually travel in it is at once seen to be an impossibility. For no sooner have *c*, *a*, etc., made their first moves in *K 2* (Figs. 2 and 3) than this cosmic line has ceased to exist and a new cosmic line has appeared that never existed before. If we regard the cosmoids that formed the old line as still existing, we must at the same time observe that each of them is adjacent to  $\frac{2U}{D}$  cosmoids none of which occupy the same relative positions with reference to it that were occupied by any of the earlier set of  $\frac{2U}{D}$  adjacent cosmoids. For example, *f* is not in the same position with reference to *a* as was *b* in the preceding

kinema. Both  $f$  and  $b$  at any time have position with reference both to their own motions and to the motions of their adjacent cosmoids. Since their adjacent cosmoids are always in motion,  $f$  can never come into the same position in relation to any cosmoid that was occupied by  $b$ . Thus  $a$  and  $f$  come into a juxtaposition that is mutually different from the earlier juxtaposition of  $a$  and  $b$ . And in proceeding farther they do not, as we have said for convenience of language, change places; having met, they pass on, taking those new positions which alone were made possible by the conditions of their adjacency to one another and to the surrounding cosmoids. Similarly, when at the end of  $\frac{D}{2}$  kinemas  $c$  and  $a$  again meet they do not, as we have said, refuse to change places, but pass on each into different surroundings from any that could ever be experienced by another cosmoid. If the motive impulse with which  $c$  and adjacent cosmoids were endowed at the end of  $K 1$  carried them forward in lines as similarly adjacent as possible, each of them would at the end of  $\frac{D}{2}$  kinemas have swerved from its original cosmic line  $\frac{D}{2}$  times, and each swerving of each cosmoid would have been different from each swerving of every other cosmoid. Thus  $c$  would in  $K (\frac{D}{2} + 1)$  find itself in the midst of cosmoids each



of which occupied a position as different from its position of  $K\ 1$  as it had been possible to realise in the course of  $\frac{D}{2}$  kinemas, and to no one of which could  $c$  bear the same relation that it bore to any of the cosmoids adjacent to it in  $K\ 1$ .

It is clear that our original cosmic line was merely a fleeting relation, which is precisely what we should have expected in the first place. If cosmoids might have travelled in it and so maintained it, it could hardly have been a reality in a universe of which the sole attribute is change. The cosmic line was composed of certain cosmoids which we represented by the letters  $a, b, c$ , etc. But if the motive impulse of  $K\ 1$  was such as to produce the moves represented in Figures 2 and 3, any moves that followed would be as simple as any other moves; since each move of each cosmoid must realise a difference from its former position of which the coefficient would be the  $\frac{2\ U}{D}$  new relationships constituting its position at any time. And in the case of any cosmoid, the only thing that would differentiate any two of its moves would be their relative positions in time.

It seems impossible to contemplate in thought any universe, one-dimensional or other, of which this, or an equivalent, statement would not be true. It matters not if we choose to speak of progress from the more simple to the more complex, — terms which

have perhaps no ultimate significance. The unique and inevitable conception of a universe that is to be maintained in contemplation is the conception of its identity with continuous progress into the different. It is likewise inconceivable that any progress should fail to realise a difference while new differences remained to be realised. Progress may realise what we call a similarity or repetition only at that point at which all possible differences have been realised. If progress realised a similarity before that point was reached, the remaining unrealised differences could not be apprehended in any way. For a universe that is not infinite cannot have two separate existences, one of higher value than the other. If progress, after realising a similarity, proceeded to realise more or fewer differences than had before been realised, the universe must be infinite and incapable of apprehension. But in an infinite universe differences would be an absurdity; for it would be impossible that any two differences should have an equal or an unequal value. In the one-dimension universe differences must not be an absurdity but the only reality; and similarity or repetition is only a manner of speaking which has no ultimate descriptive value. All possible differences form the sum of the one-dimension universe; and at the end of all possible differences it is not similarities or repetitions that are then realised, since two differences that are in reality exactly the same do not constitute a

similarity or a repetition or a subject for comparison in any way.

Thus our cosmoid *c* will never again be a part of its original cosmic line until it has been a part successively of as many other cosmic lines as there are units of time.

Hence it is clear that our cosmoids are themselves fleeting relations, like the cosmic lines. They are real solely in virtue of their change of position. Any move made by *c* is into a position different in every respect from its former position. This is to say, the total reality of *c* has fled and an entirely new reality has appeared. And not until as many new realities have appeared as may follow one upon another, beginning with *c*, will the original *c* be realised.

It matters not, then, whether we regard the cosmon as motion or as a substance, since the two are necessarily identical. But, for the convenience of language it will be advisable to speak of the cosmon as of a substance from which motion is inseparable, and of a cosmoid as imperishable. The "substance" with which we are all immediately familiar has been alluded to at the beginning of this chapter. Theoretically it is of no importance whether we conceive matter as a substance or not; for we already know that matter is composed of units — whether or not these be its ultimate units — to which to apply most of the well-known attributes of matter would be a

piece of irrelevance, whilst there is no reason to believe any of the remaining attributes of matter to be in any degree more definitely applicable. In other words, it is virtually a practical as well as theoretical necessity that the so-called properties or attributes of matter compose man's as yet inexact description of matter; the basis of his description being appearances derived from unobserved processes that do not follow material laws. But in speaking of matter we find that language and most of our habits of thought have been formed in accordance with the supposition that matter is composed of particles that are hard, soft, dense, elastic, heavy; so that the reduction to words of theoretical considerations of matter is generally a twofold process: a comparatively brief statement in traditional terms followed by the elaborate and unconventional phrases of a rigorous correction.

The case of our consideration of the one-dimension universe will be found similar. To describe in familiar terms any conceivable happenings in a universe in which at any moment of time nothing was to be found which had been there at the preceding moment, would be difficult and wearisome, nay impossible. The assumption of an appreciable degree of permanence in things is a necessary condition of actual verbal expression, and we shall therefore find it convenient in the main to keep to the symbolical treatment of the cosmoids with which

we began. But in order that their real<sup>1</sup> nature be not obscured by the factitious attribute with which we must invest them, it will be necessary first to establish as rigorously as possible the correspondence between the two and at later stages of our inquiry to recur frequently to this correspondence.

The real cosmoid, being the least possible change of position, disappears with the kinema and is replaced by another cosmoid different from the old in respect of the  $\frac{2U}{D}$  adjacent cosmoids. If  $T$  equal the number of kinemas in all time, each cosmoid is realised but once in the space of  $T$  kinemas.

The real cosmoid and its successors stray farther from the original cosmic line of  $K1$  with each successive kinema, and the farther they have strayed from it, the nearer have they approached to its realisation which takes place once in  $T$  kinemas.

The apparent cosmoid, being the smallest portion of an imperishable substance, persists as such through all time; but in no two of the  $T$  successive kinemas is it found occupying the same position relatively to any of the  $\frac{2U}{D}$  adjacent cosmoids.

The apparent cosmoid keeps to any cosmic line in which it has been travelling as long as it may, — by virtue of its tendency to get as far away as possible from a recently used cosmoid which contains a menace to its existence. After  $K1$  every cosmoid keeps to a cosmic line for  $\frac{D}{2}$  kinemas, when it encounters a fa-

<sup>1</sup> "Real" is obviously a convenient word to use; see last paragraph of this chapter.

miliar cosmoid, and both are in consequence diverted into new cosmic lines. At a later stage of the cosmic life, when long persistence in cosmic lines becomes more difficult and in consequence less frequent, an apparent cosmoid may nevertheless, if favoured by chance or by a suitable organisation of the cosmon, persist in a cosmic line for  $\frac{D}{2}$  kinemas or an even longer period.

The total difference between two series of  $T$  real cosmoids each — as of the series beginning respectively with  $c$  and  $a$ , Figure 2 — may be represented by the quantity  $T\left(\frac{2U}{D}\right)^2$ , since the original differences between  $c$  and  $a$  were as many as the number of relations borne by either to its adjacent cosmoids taken as many times as there were relations existing between the other and its adjacent cosmoids. For example, the relation of  $c$  to  $e$  was different from each of  $a$ 's relationships to its adjacent

An apparent cosmoid is more unfriendly to an apparent cosmoid more recently used than to one less recently used, for it has learned from experience that if it changes places with the former, it is more likely to find itself in uncongenial company. For the purposes of the present enquiry we need not attempt to give any provisional symbolical values to the degrees of friendliness or unfriendliness existing between cosmoids that meet under various circumstances. We have not assumed that the apparent cosmoid  $c$  had had any

cosmoids; and the same may be said of each of the other relationships that went to make up  $c$ 's reality in the universe. Now, the contemporaneous successors of  $c$  and  $a$  will, in the course of  $T$  kinemas, become adjacent to one another a certain number of times, — probably many more than  $U^2$  times, — and on any occasion of their adjacency the two series will have before them a total difference of  $T\left(\frac{2U}{D}\right)^2$ . For  $K1$  was not supposed to be the beginning of the universe, but simply a convenient point from which to undertake a consideration of it. And supposing two successors of  $c$  and  $a$  (as  $c'$  and  $a'$ ) to become adjacent in a certain kinema; and two other successors (as  $c''$  and  $a''$ ) to become adjacent  $x$  kinemas later; the difference between the series  $c' - c''$  and the series  $a' - a''$  will be  $x\left(\frac{2U}{D}\right)^2$ ; and the difference between the series,  $c'' - c'$  and the series  $a'' - a'$  will be  $(T - x)\left(\frac{2U}{D}\right)^2$ . But if

experience whatever previously to  $K1$ , nor that it had any knowledge of the value of  $T$ . And there is no question of ascribing to the apparent cosmoids any property further than that which is expressibly symbolical of actual processes in the one-dimension universe; to wit, an ability to profit by the experience of all kinemas since  $K1$ . The apparent cosmoid, then, gets as far away as possible from the cosmoid with which it last changed places, — *i.e.* it travels in a cosmic line, — unless another menace appears directly in its path; in which case it leaves the old cosmic line in favour of the best alliance it can make in the light of its experience since  $K1$ . From force of circumstances it may often remain adjacent to another cosmoid for a certain period; but the farther this period is prolonged, the more imperative becomes the need of separation.

$c''$  and  $a''$  became adjacent  $2x$  kinemas later than  $c'$  and  $a'$ , instead of only  $x$  kinemas later, the difference between the series  $c'' - c'$  and the series  $a'' - a'$  would be  $(T - 2x)\left(\frac{2U}{D}\right)^2$ . It

is seen, then, that the difference subsequently to be realised by the adjacent successors of any originally adjacent cosmoids, before the first adjacency is again realised, is greater if the shortest interval between the two adjacencies is lesser, and lesser if the shortest interval is greater. Hence contemporaneous successors of two cosmoids may remain adjacent for a certain number of kinemas; but, the universe not being infinite, they could not remain indefinitely adjacent unless some distant cosmoids remained fixed. For sooner or later this persistent adjacency would mean that other cosmoids must be persistently maintaining their adjacency. Eventually all pairs of cosmoids would be maintaining their adjacency, for they would



not be admitted to the novel differences of other surroundings where adjacencies were being persistently maintained. That all pairs of cosmoids should thus maintain their adjacencies without coming to rest is plainly impossible. Nor could the successors of two cosmoids become adjacent with more than a definite frequency. Thus, the successors of any two cosmoids whose series contain, as do the series of all pairs of cosmoids, a definite number of mutual adjacencies, would tend to protracted separations after protracted associations, and *vice versa*.

Let us now proceed with our enquiry into the careers conceivably open to our imperishable apparent cosmoids, bearing always in mind their symbolical character, and pausing from time to time to examine the correspondence between them and their prototypes. At the time when we were forced to investigate their title to the beginnings of this symbolic existence, we left them embarked on their several voyages through regions as yet comparatively free from danger. Free rovers we called them, since in no situation could we say exactly what they would

do, whilst in some situations we might not even be able to say what they would not do. Ignorant as they are of the value either of  $T$  or of  $\frac{U}{D}$ , they have as their sole equipment for life an ability to profit by their immediate experience of every kinema since  $K$  1. Their prototypes, the persistent series of real cosmoids, may be, and doubtless are, much better equipped; so well, in fact, as to eliminate all possibility of error. But we may find it of advantage to inquire if the apparent cosmoids are likely to justify their claim to a symbolic existence for all time. If they may not possibly justify this claim for the  $T$  kinemas of which they know nothing, they have no symbolic value in the one-dimension universe in which change must be realised in all possible degrees. Since we are ourselves ignorant of the value either of  $T$  or of  $\frac{U}{D}$ , it will of course be impossible to trace their careers even in a general way beyond a portion, unknown in extent, of those  $T$  kinemas that go to make up all time. But the results of any enquiry that should show these meagrely equipped cosmoids able to overcome the enormous difficulties they must early encounter and so to continue to exist for any considerable period must possess some interest, since they could only be reached through the discovery that a menace to the cosmoids' existence brought with it a measure of relief;

or, in other words, that the essential property of the cosmoids was, at least to some extent, a vital principle.

Our cosmoid  $c$  was at the end of  $\frac{D}{2}$  kinemas debarred, for the moment, from further progress in its original cosmic line. At the end of at most  $\frac{D}{2}$  more kinemas, it will be diverted from its new cosmic line. With growing experience it will come to be only by a rare chance, if at all, that  $c$  may proceed for as many as  $\frac{D}{2}$  kinemas in any cosmic line: its simple course will be interrupted with ever greater frequency. Each succeeding kinema subtracts one from the number of admissible or new arrangements of  $\frac{2U}{D}$  cosmoids around  $c$ ; and it may subtract many more than one from the number of admissible or new arrangements that are to all appearances available within the time in which the demand for them shall become imperative. It might be expected that, long before all possible arrangements had been exhausted,  $c$  or any other cosmoid should suddenly find itself in a critical situation; *i.e.* surrounded by a choice of arrangements all of which had been used, whilst the many admissible arrangements were inaccessible. It is to be remembered that we have not assumed the cosmoids to be endowed with any gift of foresight such as would

enable them to regulate the cosmic traffic and so to avert a fatal block. It is not supposed that any cosmoid should ever look beyond the  $\frac{2U}{D}$  adjacent cosmoids of which alone and of whose relative positions it may apprehend the various degrees of strangeness or familiarity. It might, then, seem highly probable that the ability of the cosmoids to profit by their experience since  $K 1$  would soon prove quite inadequate to prevent the development, somewhere in the universe, of a block such as would finally demonstrate the futility of our initial assumption.

But the earliest and perhaps by no means urgent menaces of such a dead-lock must inevitably give rise to a certain group of changes, which would be realised a vast number of times in all parts of the cosmon, often simultaneously, and under the most various circumstances. Indeed the one-dimension universe must have been comparatively young when, for the first time, all the  $\frac{2U}{D}$  cosmoids adjacent to any cosmoid, as  $c$ , found that amongst the great variety of changes open to them, none of which contained a warning of proximate embarrassment, the obvious changes lay nevertheless amongst themselves or with  $c$  (Fig. 6). With the growing requirement of more frequent deviation from cosmic lines, such groups of changes, or *centre-changes*, as we may

call them, would be realised in greater numbers, at shorter intervals, more often simultaneously. It seems clear, indeed, that the centre-change is the destiny of all cosmoids. Though it may be an incomplete definition of the ultimate destiny of all cosmoids, it is clearly a stage through which all cosmoids must sooner or later pass, if they are to persist to the end of time. But if all cosmoids, before exhausting the possibilities of free-roving, should at any time find themselves participating simultaneously in centre-changes and with no prospect

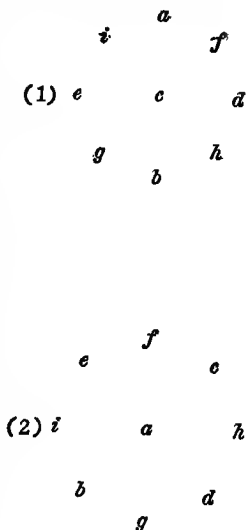


Fig. 6

of escape from these centre-changes, they could have no correspondence with anything that is real in the universe. And there can be no doubt but this crisis would eventually arise unless the centre-change itself should contain possibilities of an influence upon the cosmon such as would prevent the too frequent and too numerous formation of its kind and at the same time regularise the process of free-roving sufficiently to admit of the exploitation of its total resources. We must, then, enquire if the nature of the centre-change is such as to make it probable that its increasingly frequent formation would have this result.

That, early in the cosmic life when needs are not pressing, a centre-change should long be maintained by the same cosmoids, is of course extremely unlikely; and in those kinemas in which it was so maintained it would clearly have no direct effect upon the free-roving cosmoids nor upon other centre-changes.

On the other hand, a centre-change that was realised in one kinema and dissipated in the next without being replaced by another centre-change would be equally barren of systematic consequences; it would be, nothing more than an incident of the process of free-roving.

It is, then, readily to be seen that the centre-change most likely to have a considerable effect upon the cosmon would be one that was maintained for a considerable period, being renewed on each occasion by a different set of cosmoids.

The following questions at once arise. Could a centre-change be so maintained? If so, upon what conditions, and would these conditions probably be present in the cosmon? What, finally, would be the effect upon the cosmon of a centre-change so maintained?

We may consider these questions in the order named; but it will first be necessary to gain some idea of the relations borne to the surrounding cosmon by a group of  $\frac{2U}{D}$  cosmoids, all of which are adjacent to the same cosmoid.

At (1) in Figure 6 — in which the  $\frac{2U}{D}$  cosmoids adjacent to  $c$  are represented by  $a, f, d$ , etc. — it will be seen that the cosmic lines  $ca$  and  $cf$ , if prolonged throughout the cosmon, will always remain adjacent; otherwise there must be a cosmoid between  $a$  and  $f$  to form part of a cosmic line with  $c$  and some third cosmoid lying between the prolonged lines  $ca$  and  $cf$ , — which is inadmissible according to our initial assumption. This means that the number of surrounding cosmoids adjacent to  $a, f, d$ , etc., is

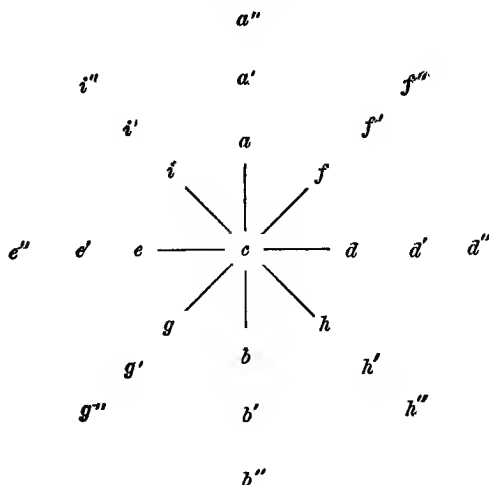


Fig. 7

$\frac{2U}{D}$ . These are represented in Figure 7 by the cosmoids  $a', f', d'$ , etc.; and the second outlying set of  $\frac{2U}{D}$  cosmoids, by  $a'', f'', d''$ , etc.

Let us try to discover how many cosmic lines or portions of cosmic diameters are represented in Figure 7.

From our earlier considerations we know that a cosmic diameter must be that portion of the cosmon in which neither more nor less than  $\frac{D}{2}$  consecutive changes of position of its  $D$  component cosmoids would bring each cosmoid face to face with its original neighbour. Each of the cosmoids would then have met one-half of the cosmoids of the line, and would not have met any of those cosmoids which are separated from it by distances of two, four, six etc., cosmoids.

In Figure 7  $a$  is separated from  $b$  by  $c$ , these three cosmoids being in the same cosmic line.

The question then arises, From how many more cosmoids, if from any, of the set  $af d$  is  $a$  separated?

Let us suppose  $f$  to be adjacent to both  $a$  and  $d$ ;  $d$  to  $h$ ;  $h$  to  $b$ ; but  $a$  to be not adjacent to  $d$  nor  $h$ ; nor  $b$  to  $d$  nor  $f$ ; nor  $h$  to  $f$ .

But  $a$  must be in a cosmic line with  $d$  and with  $h$ , because every cosmoid is in a cosmic line with every other cosmoid; and  $f$  must likewise be in a cosmic line with  $h$  and with  $b$ .

The cosmic line which contains both  $a$  and  $d$  must obviously (upon our supposition) contain either  $c$  or  $f$  or  $f'$ , — i.e. if  $f'$  is indeed adjacent to both  $a$  and  $d$ .

The line  $acdd' \dots e'$  would contain  $D$  cosmoids;



but  $e'$  could not, upon our supposition, be adjacent to  $a$ . Therefore this is not a cosmic diameter. The line  $acdhh' \dots i'$  would contain  $D + 1$  cosmoids; and  $acd h' \dots i'$  could not be a cosmic diameter unless  $\frac{2U}{D}$  equalled eight; which, as we shall later see, is virtually impossible.

If  $afd$  is a cosmic line,  $fdh$  and  $dhb$  would also be cosmic lines; and  $afdhbgei$  would be a cosmic diameter. But in the line  $afdhbgei$  such motions as are peculiar to the cosmic diameter could not take place unless  $c$  should remain fixed.

For reasons similar to the above, any conceivable prolongation of the line  $af'd$  would fail to satisfy the requirements of a cosmic diameter.

It is, then, clear that  $a$  must be adjacent to  $d$  and that, for similar reasons, each of the cosmoids  $afd$ , etc., must be adjacent to all the others except that one from which it is separated by  $c$ .

Thus,  $a$  and  $d$  are common to the two cosmic diameters  $adbb' \dots a'$  and  $daee' \dots d'$ ; and they alone are common to these diameters.

On the other hand,  $a$  and  $b$  must be common to no less than  $\frac{U}{D}$  cosmic diameters,  $acb$ ,  $afb$ ,  $adb$ , etc., all of which are identical in all but one cosmoid ( $c$ ,  $f$ ,  $d$ , etc.). Furthermore  $a$ , as we have seen, is a part of no less than  $\frac{U}{D} - 1$  other cosmic diameters,  $fag$ ,  $dae$ , etc.; and the same is true of  $f$ ,  $b$ , etc.

Each cosmoid of the first outlying set is, then, a part of no less than  $\frac{3}{D}U - 1$  lines that are unquestionably cosmic diameters; and unless this were true, it would be impossible that each of these cosmoids should be in a cosmic line with every other cosmoid in the universe. That earlier statement which we believed to be inevitably true — that any cosmoid may form a part of neither more nor less than  $\frac{U}{D}$  cosmic lines — seems now to be contradicted.

Let us make a further examination of the diagram. If, as we have said, each of the cosmoids  $afd$ , etc., is adjacent to all the others except that one from which it is separated by  $c$ , it may be adjacent, according to our earliest assumption, to but one other cosmoid, — *i.e.*  $a$  would be adjacent to  $a'$ ,  $f$  to  $f'$ , etc.; but  $a$  would not be adjacent to  $f'$ . And  $a'$ , which must be adjacent to  $f'$  and to all other cosmoids of the set  $a'f'd'$  except  $b'$ , would in addition be adjacent to one cosmoid ( $a''$ ) of the set  $a''f''d''$ .

Figure 8 represents the same kinema as Figure 7, but from the point of view of the relationships of the cosmoid  $a$ ; Figure 9, from the point of view of  $a'$ .

In Figure 8 it appears that  $a'$ , which we thought to have proved adjacent only to  $a$ ,  $a''$ , and all members of the  $a'f'd'$  set except  $b'$  is in addition adjacent to all members of the  $afd$  set except  $b$ . Similarly,  $b$  turns out to be adjacent to  $\frac{2}{D}U - 1$  members of the

$a'f'd'$  set instead of to only one member of that set, as we thought to have proved; and  $a''$  is contradictorily adjacent to  $\frac{2U}{D} - 1$  members of the  $a'f'd'$  set

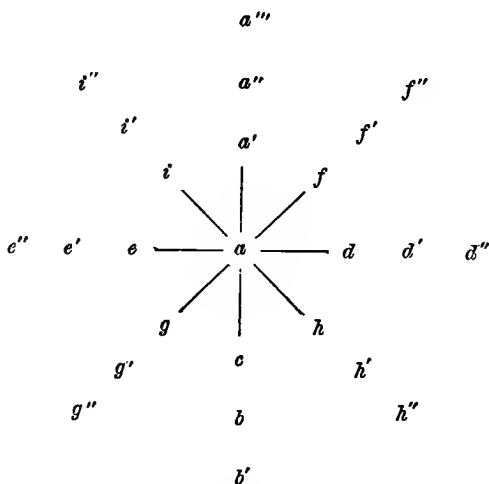


Fig. 8

In Figure 9 it is seen that both  $a''$  and  $b$  have a still more extensive acquaintance than was indicated in Figure 8; for  $a''$  is now adjacent to  $\frac{2U}{D} - 1$  members of the  $af'd$  set, whilst  $b$  is adjacent to  $\frac{2U}{D} - 1$  members of the  $a''f''d''$  set.

In such wise may it be shown that every cosmoid but one in the universe is at any time adjacent to every other cosmoid save, in any instance,  $D - 2$  of the cosmoids of that single cosmic diameter to which it is common together with that cosmoid which has

obviously but  $\frac{2U}{D}$  adjacent cosmoids. In Figure 7, for example,  $a'$  may be regarded as adjacent to every cosmoid in the universe save  $D-2$ . It may not be regarded as adjacent to itself, nor to  $c, b, b', \dots a''$ ;

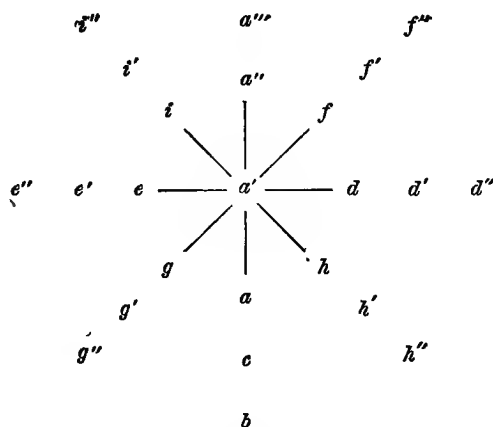


Fig. 9

$c$  being obviously adjacent to but  $\frac{2U}{D}$  cosmoids.

Again, if  $f''$  be represented with its  $\frac{2U}{D}$  adjacent cosmoids,  $c$  may be regarded as adjacent to  $a$  and to every other cosmoid in the universe except  $f', f'', f''', \dots g'$ .

These results may suggest the following reflections.

We have no knowledge of anything comparable to these apparent cosmoids, which have indeed proved contradictory of what has often been declared to be a

truth of the highest certainty. That a geometrical point or sphere, or an atom of matter, should of necessity be adjacent to no more than a certain number of other things and should, at the same time and of equal necessity, be adjacent to vastly more than this number of other things, is manifestly out of the question. No further progress in our consideration of the apparent cosmoids seems possible; not because we have led them into an absurdity, but because they seem incapable of further treatment with the means at our command. That they are by no means necessarily lodged in absurdity is sufficiently clear; since our recent considerations have but served to bring out the self-assertiveness of that uncomprehended reality which lies beneath our symbols. A real cosmoid, be it remembered, is a change of position inseparable from a kinema. The cosmoid-position at any time with reference to surrounding cosmoid-positions is not to be determined with reference rather to the end of the kinema than to its beginning, nor *vice versa*. Yet the kinema implies a difference in it. And kinemas are not only not divisible into parts, but are not separable one from another any more than cosmoids are so separable. Thus we are confronted with the conclusion that we must have expected to reach in our consideration of the one-dimension universe: that our unit of time is not expressible in terms of seconds, nor our unit of space in terms of inches or of cubic

inches; that when we speak of two kinemas or of five cosmoids, we do so purely in deference to our necessarily geometrical point of view; the real cosmoid having an existence inseparable from the whole common, the real kinema, an existence inseparable from all time. A single real cosmoid or change, if completely understood, would inevitably reveal the nature of every other cosmoid, for its existence is determined by that of all other cosmoids. And, similarly, a single kinema, if completely understood, must reveal the nature of all other kinemas. Since, moreover, the cosmoids are inseparable from the kinemas, each single cosmoid implies the total possibilities of the universe; kinemas thus become equivalent to cosmoids. It follows that, though our single apparent cosmoid requires the quasi-geometrical adjacency of not more than  $\frac{2U}{D}$  other cosmoids, the ungeometrical nature of the real cosmoid requires the "adjacency" of all other cosmoids. We may, then, have an undiminished faith in our one-dimension universe. That no other universe seems capable of being maintained in thought; that many implications of matter and of mind point significantly to this one-dimension universe: the force of these considerations is strengthened, not weakened, by the discovery that the reality behind our symbolical cosmoids is ever ready to thwart our attempts to represent them geometrically.

The real difficulty that has arisen is one of treatment. If no correspondence is apparent between geometrical concepts and the ever menaced symbols of real cosmic processes, of what use has been this detailed consideration of the cosmoids? Geometrical concepts, whether fundamental or not, exist in the universe in which we live, and they influence all our considerations even of ungeometrical processes. If we cannot discover how they are derived from the processes of the one-dimension universe, of what use is it to know if the apparent cosmoids may continue to exist for a considerable period? How, indeed, could this be known? What can be the possible significance of a centre-change?

But if we again consult these diagrams which have exhibited the geometrical contradiction of the adjacency of cosmoids, we shall find that they do at the same time exhibit a striking correspondence between a certain feature of the one-dimension universe and a familiar geometrical concept.

In Figure 7,  $c$  is a cosmoid which separates  $a$  from  $b$  and prevents the adjacency of  $a'$  to  $b'$ , of  $a''$  to  $b''$ , etc. It exercises this power solely by virtue of its being adjacent to but  $\frac{2U}{D}$  other cosmoids.

In Figure 9,  $a'$  alone, of all the cosmoids represented, is adjacent to no more than  $\frac{2U}{D}$  cosmoids.

Our earliest conception of the real cosmoids

(page 98 et seq.) has been modified so that, with reference to the whole cosmon in all time, we regard both  $c$ , in Figure 7, and  $a'$ , in Figure 9, as adjacent to all other cosmoids. But all time and all cosmon have definite values by virtue of the differences existing within them, even though these differences be not finally measurable by the numbers which we use in describing the enduring appearances of actual life. And, though the divisibility of time into  $T$  kinemas, and of the cosmon into  $U$  cosmoids, be, as we have seen, but an illusory though practically necessary verbal image, it is impossible either in diagram or in thought to represent the cosmon as devoid of such restrictive relations as that of  $c$  (Fig. 7) to its  $\frac{2U}{D}$  adjacent cosmoids. Such relations, indeed, are ubiquitous and belong to all our diagrammatic cosmoids. Regarded geometrically, they are fixed for all time, bearing certain relations to one another which never vary. The cosmoid  $c$  and its successors do not remain in the positions represented in Figure 7, but the relation of one cosmoid to  $\frac{2U}{D}$  adjacent cosmoids remains. There are always as many such relations as there are cosmoids in the universe. These fixed relations are, as we know, purely imaginary; they form the limitation of the real; or again, as represented in thought, they are those unreal relations with reference to which alone real relations



may be comprehended. So far as we have considered them, they seem, then, precisely equivalent to geometrical points.

That they could never be apprehended in thought or otherwise unless the real should persist through time, is obvious. But if, upon this field of *U* unreal relations, things may move and bear varying, not fixed, relations to one another, the unreal relations may be of value as a measure of these real motions or relations. The question arises, What motion, if any, may take place upon this field of unreal relations?

Our free-roving, apparent cosmoids may never move save to form a part of these unreal relations which bear fixed relations to one another.

But an unreal relation may itself be conceived as moving from one position to another; it would then be the unreal thing necessarily postulated when real motion is to be apprehended in any way. In such motion the assumed *c* and its adjacent *afd*, etc. (Fig. 7), would sooner or later disappear from the relation, being replaced by other cosmoids; but the relation that existed between *c* and *afd* would be preserved instead of becoming identified with another relation such as that of *a* to *a'fd* (Fig. 8).

If the relation between *c* and *afd* is to be preserved, each successive set of cosmoids that form this relation must be supposed to remain in the

relation during at least one of the units of time. For if *afd* should no sooner become adjacent to *c* and to one another than some of them withdrew, the relation would have been in no way different from those other  $U-1$  relations that bear immutable relations to one another. It would therefore be incapable of motion. It would be simply an incident of the process of free-roving which invariably leads cosmoids into fixed relations. To establish a relation that is not incapable of motion, the process of free-roving must, then, be modified. And the only obvious possibility of a modification of free-roving lies in the formation of the centre-change, — a change which has been seen to be inevitable. The cosmoids *a*, *f*, *d*, and *c*, on becoming adjacent, move in some such way as indicated in Figure 6, and their successors in the relation do likewise. It is clear that, if the relation is to be maintained for a period of time sufficient to give any significance to its formation, it must exercise some organising influence upon the cosmon adequate to the requirement that at regular intervals a definite amount of such cosmoids be brought to its borders as are capable of the mutual interchanges indicated in Figure 6. In other words, while the unreal relations of free-roving cosmoids remain fixed in their positions, and while even *a*, *f*, *d*, and their successors in the mobile relation are themselves participating in unreal relations, our initially mobile relation must

be using all cosmoids within reach of its influence to preserve its mobility.

It is seen, then, that if the value of the geometrical point as a conception precedent to the comprehension of any motion in the one-dimension universe is to be demonstrated, it must probably be through that same formation and process through which alone the symbolic existence of the apparent cosmoids may be prolonged for a greater period than would be possible under the conditions of free-roving alone: the formation, to wit, of the centre-change, and the process by which it may be systematically maintained.

In the course of our further enquiry it will appear that, if there is indeed any cosmical process adequate to the prolonged maintenance of a centre-change, such a process would maintain the centre-change equally well in a state of real motion and in a state of imaginary rest. Which is only a manner of saying that the centre-change might have different rates of motion in time: that it would not necessarily move in a cosmic line at the rate of one cosmoid per kinema, but might equally well move at the rate of one cosmoid per three or five or any number of kinemas. But, since the cosmoid is the assumptive spatial unit of the one-dimension universe, it follows that the centre-change, during any kinema in which it is not moving a distance of one cosmoid, is in a state of assumptive rest. In examining any sys-

tems of supply adequate or inadequate for the maintenance of a centre-change it will, then, be convenient first to regard the centre-change as in a state of rest, and reserve for a later consideration the implications of its motion.

It will further appear, in the course of our enquiry, that only those centre-changes could survive for a considerable period which were supplied under a system having the highest possible efficiency; that any centre-change supplied under a system having a lower degree of efficiency would labour under disadvantages so great that it would in a comparatively short time give way to other centre-changes supplied under the most efficient system.

It being obvious, as we have already observed, that the centre-change possessed of the highest organising power over the cosmon would be one from which as many as possible of the participating cosmoids depart in each second kinema, to be replaced by other cosmoids, it is to this kind of centre-change that we may with a saving of time confine our attention.

The number of cosmoids that may depart from a centre-change in each second kinema is approximately  $\frac{2U}{D}$ . The symbolical quantity  $\frac{2U}{D}$ , if it were exactly expressible in numbers, would doubtless be so great that we should not need to concern ourselves with the questions, whether it were ex-

pressible by an even or by an odd number; nor whether such a mutual interchange as that of  $c$ ,  $a$ , and  $f$ , in Figure 6, were symbolically a suitable representation of a real occurrence in the one-dimension universe. Whether the output of the centre-change per two kinemas would be  $\frac{2U}{D}$  cosmoids, or  $\frac{2U}{D} - 1$ , or  $\frac{2U}{D} - 2$ , is therefore a question possessing no great significance in the present enquiry. What we wish to ascertain is, what possible influence upon the cosmon, and secondarily upon the centre-change itself, would be exerted by the departure from a centre-change of the maximum amount of cosmoids per two kinemas, and by any conceivable subsequent dispositions of these cosmoids. And for convenience we may suppose this maximum output per two kinemas to be  $\frac{2U}{D}$  cosmoids.

Now, it is obvious that these  $\frac{2U}{D}$  cosmoids, after executing a centre-change, must, if they then depart from the centre-change, depart from it in cosmic lines, leading to the centre-change. For example,  $a f d$ , etc., in Figure 7, must change places with  $a' f' d'$ , etc. If the centre-change is then to be maintained for yet another kinema, the set of cosmoids (or *cosmic row*, as we may henceforth term it)  $a' f' d'$  must be of a nature to permit of a centre-change

taking place amongst its members. After their migration from the centre-change, *afd* may persist in the cosmic lines of their migration, taking the former positions of *a''f''d''*, or some of them or all may stray into new cosmic lines; *b* may take the former position of *b''*, while *h* changes with *d*, and *f* with *a*; *h* and *a* may then change with one another or take the former positions of *d''* and *f''*. In such various wise may these and succeeding migrants from the centre-change proceed throughout the cosmon or return early to the centre-change itself. And it would seem probable that, with the continuous increase of restrictions imposed upon the process of free-roving by the hand of time, all possible combinations of persistence in, and straying from, cosmic lines on the part of migrants from the increasingly frequent formations of centre-changes would eventually be realised, even if the contemporaneous formation of centre-changes had not, as we shall see it must have, a marked influence upon the process. Most of the earlier centre-changes would doubtless perish after one kinema of existence because the newly imported set of cosmoids would find better alliances offered them than those constituting a complete change amongst themselves. And most of those centre-changes which were realised twice consecutively would then perish because of the unfitness of the third imported set of cosmoids. But on each occasion, when importunities from

without and mutual aversions within had been satisfied by the disruption of the centre-change, the same conditions, somewhat modified but always more and more emphasised with the lapse of time, would still exist, leading to the proximate reformation of a similar centre-change. Not, however, until its successive sets of migrants had persisted or strayed in such a way as to ensure the presence, in alternate kinemas at the border of the centre-change, of  $\frac{2U}{D}$  cosmoids that were not mutually unfriendly, would any centre-change attain to a considerable degree of stability; and then only provided this peculiar system of supply should safely perpetuate itself. If such a system be possible it seems almost certain eventually to be realised. To discover if it is indeed possible being one object of this enquiry, let us to that end first consider some of the consequences of the persistence of migrants in the cosmic lines of their migration. In this consideration an obvious question, How are we to regard geometrically the relation of a centre-change to the outlying cosmon? will be ignored, since this question may be more advantageously approached after the completion of our review of the various conceivable systems of supply.

If all  $\frac{2U}{D}$  migrants persist indefinitely in their original cosmic lines, they will ensure the ap-

pearance at the border of the centre-change in alternate kinemas of a complete set or cosmic row of  $\frac{2U}{D}$  cosmoids which were mutually adjacent at the time when they were displaced inwards by the outgoing migrants. To suppose that such persistence of migrants could result in any prolonged maintenance of the centre-change is to suppose that all sets of  $\frac{2U}{D}$  mutually adjacent cosmoids would in successive kinemas become disposed to a centre-change amongst themselves; a supposition which, in view of the necessary conditions of free-roving, is obviously unworthy of consideration.

If, in the second kinema after the centre-change, all the migrants stray from their original cosmic lines, — *i.e.* change places with one another, — the centre-change must be maintained by only two sets of  $\frac{2U}{D}$  cosmoids each, and could not long survive.

It seems, then, that if an adequate system of supply is possible, it must be one under which some of the migrants persist whilst others stray.

Let us consider the implications of the indefinite persistence in their original cosmic line of a single column of migrants, separated each from its successor by a displaced cosmoid which likewise will obviously persist in the cosmic line as far as the border of the centre-change.



In addition to the above-mentioned displacement of cosmoids, the prime migrant — *i.e.* the persistent migrant which is the most distant from the centre-change of all the migrants in its own cosmic line — provides an inducement towards the centre-change amongst every set of cosmoids equidistant from the centre-change (*i.e.* amongst every cosmic row) through which it passes. The result of this passage of a prime migrant through any cosmic row is that a member of this row is started towards the centre-change in a cosmic line adjacent to that of the outgoing migrant and incoming displaced cosmoid, and is, in the next kinema but one, followed by a second member of the same row, not in the same but in an adjacent cosmic line. In the fourth, sixth, eighth, etc., kinemas one member each of the same row is started towards the centre-change in adjacent cosmic lines; and all the cosmoids thus orientated will, if not systematically interfered with, persist in their cosmic lines at least until the change next but two to the centre-change is reached. None of the migrants in any given cosmic line have any effect whatever upon the cosmic rows through which they successively pass except the prime migrant.

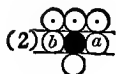
The reason of this orientation is seen in Figure 10 which represents the passage of a prime migrant and other migrants of the same cosmic line through three cosmic rows.

● represents a persistent migrant.



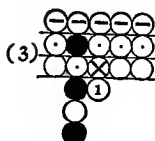
⊕ represents an orientate.

} represent free rovers of like  
cosmic rows.

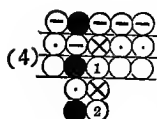


Let the centre-change be in the direction of the bottom of the page.

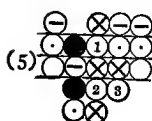
When, at (2), the prime migrant displaces a rover of the first row (○○) in the direction of the centre-change, it by so much relieves the tension of free-roving in that row.



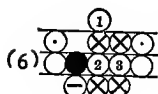
The adjacent rovers of the same row find that a familiar, outwearing associate has been taken off their hands and effectually disposed of.



A tendency is thus created amongst them to follow after the removed and rejuvenated rover whose new associates have better to offer than anything in the old surroundings of the row.



But the greatest inducement of all may perhaps be offered by the presence in the row of the migrant itself, which would probably be the least familiar cosmoid in the immediate neighbourhood of a row situated at any considerable distance from the centre-change.



The migrant, however, refuses all offers and passes on; whereupon either ⊕ or ⊙

Fig. 10

in this same kinema, or either of their successors in the following kinema, is free to respond to the inducement offered by the removal of their old associate. The only movement either can make by way of response is in a cosmic line adjacent to that in which the migrants are travelling, since there is no place for them in that cosmic line which is composed of migrants and displaced cosmoids. If both ☉ and ☿ should set out in cosmic lines towards the centre-change, one or other of them would soon find its progress checked. Only one rover of any row is displaced by a prime migrant. If more than one additional rover set forth at once for the renovating source, all but that one which is systematically forwarded to the centre-change in the manner presently to be described would fail, except by a rare chance, to reach the centre-change because of those very restrictions upon free-roving which have led to the formation of the centre-change. If many rovers of the same row should set forth together for the centre-change in response to the inducement offered by a single migrant, and should actually reach the border of the centre-change, they would by virtue of their mutual antipathies constitute a menace to the centre-change which must be taken account of if the centre-change was disrupted and a new one formed in the same neighbourhood.

Which of the two rovers ☉ or ☿ should be successful in its quest and at the same time destroy for

the moment the inward tendency of the row, was determined at the time of the prime migrant's departure from the centre-change. Let us briefly consider the conditions of this departure.

If it is not already obvious, it will soon appear that the persistence of all migrants for one kinema after their emergence from the centre-change is a necessary condition of the mobility of centre-changes; and to this class of centre-changes we may confine our attention. When the prime migrant under consideration passed through the third outlying cosmic row, the cosmoid of that row which responded to the orientative influence would be that cosmoid which was offered the best inducement by a member of the second outlying row. The member of the second row offering such inducement would be a migrant that had strayed from its original cosmic line. Supposing the best inducement to have been offered on the right of the column of persistent migrants, the straying migrant which then replaced the orientate of the third outlying row would in the next kinema offer the cosmoid on the right of the persistent migrants' cosmic line in the fourth outlying row a better alliance than would be offered the cosmoid on the left.

It is to be observed parenthetically that rights and lefts are here only a manner of speaking adopted in conformity to the exigencies of diagrammatic representation; for ⊕ and ⊙ (Fig. 10) are them-

selves mutually adjacent, and all cosmic lines leading to the centre-change are mutually though differently adjacent. By the successive orientation of cosmoids on the *right* of a column of migrants is meant the successive orientation of cosmoids that are *similarly adjacent* to the migrants' cosmic line.

The straying migrant is thus induced into a cosmic line adjacent to that of the prime migrant which it henceforth follows at a distance of two cosmoids, being itself followed at intervals of two, four, six, etc., cosmoids by similar migrants all travelling in the same cosmic line. These induced migrants (⊙ and ⊙, Fig. 10) ensure the persistence of orientates in their cosmic line at least as far as the change next but two to the centre-change; but, more than this, the prime or leading induced migrant will inevitably orientate a cosmoid in every cosmic row through which it passes, for it offers precisely the same inducement as the original prime persistent migrant. This process of secondary orientation is represented at (4), (5), and (6) in Figure 10. And the prime induced migrant is followed at intervals of two, four, six, etc., cosmoids, in an adjacent cosmic line, by another set of induced migrants, of which the prime migrant, ⊙, is engaged in a similar process of orientation. Since all cosmic lines leading to the centre-change are mutually adjacent, and since each one of them contains, in the third outlying row, either a persistent or a straying migrant, it is clear

that the secondary orientation might, and if not systematically interfered with would inevitably, spread continuously over as many cosmic lines as there were units of distance between the original prime migrant and the centre-change.

That no migrant, whether originally persistent or induced, is ever in a position to orientate, except only the prime migrants, is seen in the diagram, which shows that the prime migrants alone displace members of cosmic rows.

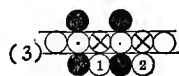
If any migrant persists in its original cosmic line for as many as  $\frac{2U}{D}$  kinemas, the wave of its orientates will spread over all cosmic lines that pass through the centre-change. If more than one original migrant persists for  $\frac{2U}{D}$  kinemas, the result will be that, in the change next but two to the centre-change, all displaced rovers that have been drawn towards the centre-change will have eliminated an equal number of otherwise possible orientates. The elimination of the orientate is illustrated in Figure 11, in which it is seen that the prime induced migrant ① has not exerted the orientative influence upon the row  $\square\square$  which it would have exerted but for the persistence of an original migrant in the adjacent cosmic line. Both ② and ③ are displaced rovers which deny to ① the power of orientation.

The importance of the elimination of orientates

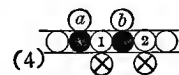
as a factor in the efficiency of systems of supplying a centre-change will obviously be very great, if the most efficient systems are found to be those in which the successive straying of migrants leaves an ever weaker migratory representation in cosmic rows in proportion to their distance from the centre-change.



Every orientate eliminated will then mean the subtraction of one from the number of cosmoids in its own cosmic row that must participate in every kinema of the centre-change. In place of the eliminated orientate is always a displaced cosmoid from a row whose numerical representation in the centre-change is weaker.



Now it is clear that, if one or more original migrants persist in their cosmic lines for as many as



$\frac{2U}{D}$  kinemas, the sum of the orientates and displaced rovers taking

part in any kinema in the change next but two to the centre-change will be the number of displaced

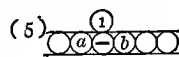


Fig. 11

rovers that took part in the preceding change, plus the number of prime migrants, original and induced, persisting in that kinema in their cosmic lines,

minus the number of otherwise possible orientates that have been eliminated by displaced rovers. But for every orientate that has been eliminated there is present in the change under consideration a displaced rover. Thus a simpler and equivalent statement is that there are in any kinema as many fresh cosmoids taking part in the change next but two to the centre-change as there are prime persistent migrants, original and induced, which are in that kinema in a position to orientate. This statement, however, is true only provided all the migrants in any cosmic line stray from that line at the same distance from the centre-change. That such would indeed be the case becomes patent upon further consideration. So long as a prime migrant persists in its original cosmic line, each of the following migrants of the same cosmic line finds that in each kinema no better alliance is available than that one which enables it to get as far away as possible from its most recent associate. This alliance is furnished by a cosmoid which was originally displaced from its row by the prime migrant, and with which each following migrant is consequently as unfamiliar as with any other adjacent cosmoid. The displaced cosmoid is, of course, likewise inclined to this alliance above all others. Thus, while the prime migrant persists in the cosmic line, all following migrants will so persist. When a prime migrant strays, it may conceivably, after its first departure



from the original cosmic line, keep to a new cosmic line. If so, the following migrants will stray at the same distance from the centre-change and in the same new cosmic line. The process is represented in Figure 12. If the migrant be supposed to stray after reaching the row  $\overline{OO}$ , the only departure it can make from its original cosmic line is into the row itself. (Cf. Fig. 7.) It may then change with  $\odot$  (Fig. 12). To persist in its new cosmic line means to change next with  $\ominus$ , this cosmic line being equivalent to *aff'* in Figure 7. At (4), in Figure 12, the displaced cosmoid for the following migrant to change with is  $\ominus$ , which will pursue that cosmic line in which it is offered the best alliance.  $\odot$ , on the other hand, has no preponderating inclination to change with the following migrant because of its new adjacency to the prime migrant.  $\ominus$ , then, takes the position shown at (5). It will be seen that with the migrants' change of cosmic lines systematic orientation towards the centre-change ceases. The prime migrant's change with  $\odot$  has obviously no orienta-

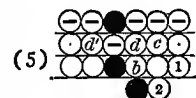
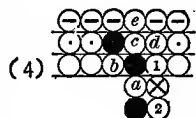
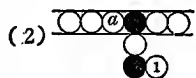
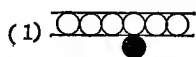


Fig. 12

tive consequence. Its subsequent departure from the row  $\overline{\odot\odot}$  leaves an orientative impulse in that row. But, at (5),  $\odot$  may not satisfy this impulse because  $\odot$  would repel its advances. It must therefore be another cosmoid, as  $\odot$ , which moves into the row  $\overline{\odot\odot}$ , where it finds no induced migrant to attract it further towards the centre-change. At (4) the induced migrant  $\odot$  may not persist in its original cosmic line. Not only does it not, as hitherto, find an orientate desiring its alliance, but the rover  $\odot$  may not change with it because of the requirements of  $\odot$ , which may not change with the prime migrant and will not change with  $\odot$ , which is in the opposite direction from the renovating influence.  $\odot$  therefore changes with  $\odot$ ; and  $\odot$  enters a new cosmic line, its last orientative influence having been exerted in the row next to  $\overline{\odot\odot}$  in the direction of the centre-change.

In those cases in which the original prime migrant, in straying from its original cosmic line, does not keep to a new cosmic line — and such would doubtless in time come to be the universal procedure — the straying of following migrants and the cessation of systematic orientation are an obvious necessity which requires no separate illustration.

From these considerations we derive the following general statement: Any system of supply that might maintain a centre-change for any period would be self-perpetuating during this period.

It is readily to be seen that many a centre-change forming under those conditions which were making its formation inevitable would be far from deficient in means of support, if its agents were only required to supply cosmoids from distant regions of the cosmon; for the persistence in cosmic lines of but a few migrants from the centre-change — a persistence such as would doubtless occur in all possible degrees of numerical importance — would be the means of inducing into cosmic lines an indefinite number (up to  $\frac{2U}{D}$  per two kinemas) of straying migrants.

This deadwood of discarded cosmoids would thus be effectually removed, and an indefinite number of fresh cosmoids would in alternate kinemas be deposited at the border of the centre-change ready for use. But since the cosmon consists of a succession of cosmic rows, each row containing  $\frac{2U}{D}$  cosmoids, it is obvious that supplies brought from distant regions of the cosmon will be inadequate to the maintenance of a centre-change for as long a period as is possible within the portion of the cosmon visited by its migrants unless each set of cosmoids arriving simultaneously at the border of the centre-change come from the most different possible regions of the cosmon, and from the most dissimilarly adjacent portions of necessarily similar regions of the cosmon. An instance of the menace to the integrity of centre-

changes contained in the orientation of similarly adjacent portions of cosmic rows would be as follows:

If, from the row next but one to any centre-change, as many as  $\frac{U}{2D}$  migrants persisted in their original cosmic lines for as many as sixteen kinemas, the consequence of such persistence would be that the company of orientates and displaced cosmoids provided for the renewal of this centre-change would be divisible into groups of mutually unfriendly cosmoids which had been displaced or orientated at similar positions in the same and in adjacent rows. And the lapse of time would cause this mutual unfriendliness to become rapidly more marked.

It is clear, then, that if the centre-change is to be maintained for the longest period compatible with the ultimate resources of that portion of the cosmon which comes under its influence, migrants must persist in such numbers, for such periods, and in such lines, as will ensure the participation in the change next but two to the centre-change of exactly as many orientates from dissimilarly adjacent portions of the cosmon as there are straying migrants from the second outlying row requiring to be induced away in cosmic lines. These orientates together with the consequently dissimilarly displaced cosmoids taking part in the same change would provide the centre-change with the exact amount of fresh cosmoids that it required, none of which would nec-

essarily be mutually unfriendly, and all of which might be mutually welcome if the persistence of migrants was a process as symmetrical as in many of the vast number of cases of centre-change formation it must chance to be.

Let us examine some conceivable systems of supply, adequate or inadequate to the task of maintaining a centre-change for any period likely to ensure its having a considerable effect upon the process of free-roving.

Supposing that, of the  $\frac{2U}{D}$  migrants issuing in each second kinema from a centre-change, but a single one persisted thenceforth in its original cosmic line (*AB*, Fig. 13), and that this migrant and its following migrants so persisted for  $\frac{2U}{D}$  kinemas and then strayed; there would result from this persistence, and from the consequent induction of straying migrants into cosmic lines to distances of  $\frac{2U}{D} - 1$ ,  $\frac{2U}{D} - 2$ , etc., cosmoids from the centre-change, a deposit in alternate kinemas at the border of the centre-change of cosmoids exactly sufficient in number to remove the discarded straying migrants and to renew the centre-change. But there are obvious disadvantages in this system of supply.

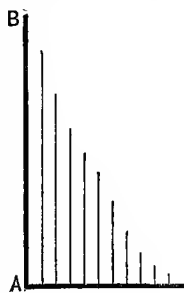


Fig. 13

In the first place, it is hardly supposable that the centre-change should not have been disrupted by the congestion of straying migrants long before the system of relief had been established. But even if the centre-change had managed somehow to supply itself in the meantime, the system would still be defective. Under its operation displaced and orientated cosmoids would be taken from the same portions of cosmic rows while the other portions of these rows remained unorganized. Its life would then be short as compared with that of centre-changes supplied under other conceivable systems.

It is clear that the system possessing the highest efficiency would be one under which the most distant possible regions of the cosmon were visited, and under which all migrants persisting as far as any given cosmic row arrived in the most dissimilarly adjacent portions of that row. And this system is readily to be discovered upon the examination of but two other systems of supply. Of these two the advantages and disadvantages are obvious enough; and from them it will appear that no other system need be considered.

*A.* In the third kinema after the centre-change, one-half of the migrants persist in the original cosmic lines; and in each succeeding kinema the number of persistent migrants is reduced by one-half.

*B.* The second kinema after that of the centre-change being Kinema No. 1, as many migrants per-

sist in their original cosmic lines in each succeeding kinema as the square of the number of the kinema is contained times in  $\frac{2U}{D}$ .

The persistence of migrants under these two systems is represented collaterally in Figure 14, Kinema  $n$  being that kinema beyond which no migrant persists in its original cosmic line.<sup>1</sup>

In each second kinema, under  $A$ ,  $\frac{U}{D}$  orientates would take part in the change next but two to the centre-change, and would be just sufficient to induce the  $\frac{U}{D}$  straying migrants into cosmic lines and remove them from the neighbourhood of the centre-change. And at the same time  $\frac{U}{D}$  displaced cosmoids would arrive from various regions; thus the centre-

K	A	B
$n$	1	1
8	$\frac{U}{64 D}$	$\frac{U}{32 D}$
7	$\frac{U}{32 D}$	$\frac{2U}{40 D}$
6	$\frac{U}{16 D}$	$\frac{U}{18 D}$
5	$\frac{U}{8 D}$	$\frac{2U}{25 D}$
4	$\frac{U}{4 D}$	$\frac{U}{8 D}$
3	$\frac{U}{2 D}$	$\frac{2U}{9 D}$
2	$\frac{U}{D}$	$\frac{U}{2 D}$
1	$\frac{2U}{D}$	$\frac{2U}{D}$

<sup>1</sup> For *kinema* may be substituted *cosmoid* or unit of distance.

Fig. 14.

change would receive material sufficient in amount for its support. It is obvious, however, that, under *A*, a much smaller portion of the cosmon would be affected than under *B*. Hence the life of centre-changes supplied under it must be much shorter; and when we come to consider the relations between centre-changes, we shall see that the formation of centre-changes under *A* would not be favoured by the contemporaneous existence of centre-changes supplied under the better system. A further defect in *A* is that under this system no single migrant could persist in its original cosmic line for as many as  $\frac{2U}{D}$  kinemas. In each kinema the ratio of straying to persistent migrants is constant and equals 1. Therefore Kinema *n* could not be identical with Kinema  $\frac{2U}{D}$ , no matter what was the value of  $\frac{2U}{D}$ . And if  $\frac{2U}{D}$  was greater, these two kinemas would be no nearer to one another than if  $\frac{2U}{D}$  was smaller. Since, then, no migrant could persist for  $\frac{2U}{D}$  kinemas, nor any two migrants for  $\frac{U}{D}$  kinemas, nor any eight for  $\frac{U}{4D}$ , that elimination of orientates described above (page 142 et seq.) could not be accomplished to its fullest extent. Under any conceivable variety of *A*, it would doubtless occur in comparatively small measure, and the participants in the centre-change



would always, in consequence, be dangerously well acquainted. Nor would any modification of  $A$  ensure the persistence of a migrant for as many as  $\frac{2U}{D}$  kinemas without at the same time increasing the orientation in such a way as to produce an equivalent result.

Systems such as  $A$  may perhaps be regarded as stepping-stones to  $B$  which possesses both the qualifications that were lacking in  $A$ . The better we comprehend the implications of the diagram, the more deeply are we impressed with the enormous difference in efficiency between these two systems. If the quantity  $\frac{2U}{D}$  be sufficiently great or sufficiently small, the series of diminishing ratios of the straying migrants, under  $B$ , will eventually coincide with the series of index numbers of the kinemas: Kinema  $n$

will be identical with Kinema  $\frac{2U}{D}$ ; i.e.  $\frac{\frac{2U}{D}}{\left(\frac{2U}{D}\right)^2}$ , will

equal 1. Under the most symmetrical and therefore longest-lived form of  $B$ , all migrants would arrive in the most dissimilarly adjacent portions of cosmic rows, and all orientates from rows near the centre-change would be eliminated.

Some such series of ratios as under  $B$  is what we should expect to find of use in describing any one-

dimensional process. That the centre-change must inevitably be evolved in the course of our symbolical cosmic life, and that, once evolved and maintained, it would undoubtedly occasion the postponement for a considerable period of the otherwise inevitable dead-lock in free-roving, are, under the circumstances, interesting considerations. Under any other circumstances their significance would be doubtful. If the centre-change had shown that it might be indefinitely maintained in accordance with a strictly mathematical process of regeneration, it would probably be useless to proceed further with any enquiry into its implications, for we should then believe it to have little or no value as an intermediate symbol of ultimate processes. In the universe in which we live two things may safely be said of numbers. One is, that they are at least an approximate measure of phenomena or appearances within certain limits; the other is, that beyond these limits they cease to be even an approximate measure. They carry in themselves both the assertion of their restricted, approximate validity, and the admission of their ultimate and absolute incompetence; and in the two systems of supplying a centre-change that we have been considering they furnish us with both intimations. If, they say, we are of any value whatever, do not expect that any process of ultimate dimensions or of cosmical implications will be described by a series to which we can place the final term. Your

system *A* lies within our jurisdiction. Under it, we can assure you, *n* could never equal  $\frac{2U}{D}$ . But when you approach the ultimate possibilities of a universe in which nothing is fixed, you can hardly expect us, the unchanging creatures of your own brain, to provide you with an adequate formula. Of your process *B* only that portion lies within our jurisdiction which has been incorporated within your own, our parents', very limited experience. Outside these limits we guarantee nothing save our own incompetence. Nevertheless, you say that the universe of continuous change, which is the only conceivable universe, requires that a quantity sufficiently great or sufficiently small, if divided by its square, shall produce the quotient 1. Well, this may be guessed from our behaviour in the series in question.

Thus the process by which all stable centre-changes would be maintained is precisely that kind of process in which it is possible to place belief, — a process, to wit, which in its entirety is not measurable by numbers, but which within certain limits is approximately so measurable.

At this point it is perhaps desirable that, risking repetition, we define somewhat more fully than hitherto our position in this enquiry into the probable behaviour of the apparent cosmoids.

It is unnecessary to rehearse our reasons for postulating the one-dimension universe, since they are well known and readily comprehensible. Having postulated this universe, of which the essential principle is continuous change and in which all possible differences must be realised in all time, it became an obvious necessity to represent its change in the sum by the units of an imaginary imperishable substance in continuous motion. Our cosmoid was a symbol, or potentially an "appearance," such as alone was capable of treatment in actual language. This symbol, to have any correspondence with its prototype, must be invested with the attribute of an ability to profit by experience, — an attribute which, though doubtless illusory when considered as a possession of the human race itself, does nevertheless seem to be possessed by all animate things, and which, as a seeming attribute, is not to be excluded from the inanimate world. Our so-called free-roving and the growing restrictions imposed upon it, the consequent formation of the centre-change and its dissolution under the most various circumstances, leading eventually to the persistence of mobile centre-changes, the process of displacement and orientation of restricted free rovers, permitting the survival of those centre-changes alone which are supplied under a system not wholly referable to the principles of numbers, — all these episodes in the career of the apparent cosmoids seem naturally derivable

from that essential attribute with which, if they are suitable symbols, they must be invested. Incomplete as may be our diagrammatic representations of cosmical processes, they deal nevertheless with legitimate subjects of enquiry and may lead to interesting conclusions.

Our cosmoids and the centre-changes evolved in the course of their free-roving have not as yet shown a definite correspondence with any observed appearances; and if they fail to show a reasonable probability of such correspondence, our consideration of them will have been lacking in interest. But since the centre-change has indeed indicated a possibility of such correspondence, let us proceed to enquire into the probable implications of its motions.

It will be seen that a centre-change would be capable of motion in a cosmic line or of revolution about its own centre. In the former case a centre-change would be executed in the first outlying row by the newly imported set of cosmoids; and the old centre-change would become the first outlying row of cosmoids destined to persist and stray as migrants. This symbolical necessity of regarding a centre-change as a limit in front of which lies the whole cosmon will presently be considered.

However unlikely it may later appear that any but the earliest centre-changes would ever be suffered to move in a cosmic line at a uniform velocity, it

seems highly probable that if a centre-change did so move, its accompanying system or field of organised cosmon would not be disturbed within itself but, since all cosmic lines leading to the centre-change are mutually adjacent, would merely be shifted from one portion of the cosmon to another, in accordance with the motion of the centre-change itself. But during periods of acceleration or retardation or of revolution about its centre, all the regenerating cosmoids would, on reaching the centre-change, find themselves in different situations from those of their immediate predecessors, and all the cosmic lines of displacement and orientation would in consequence suffer a change. The centre-change would then be disrupted and at once reformed from the material immediately at hand, having meanwhile exercised a new influence in all portions of the cosmon lying within its field. Our symbolical centre-change would thus possess something akin to the property of matter called inertia.

The question now arises, What could give direction, or velocity, or any distinguishing feature to the motion of a centre-change? If there was but one centre-change in the universe; or if, of a number of contemporaneous centre-changes, no two lay each within the other's field, it would seem that there could be nothing to determine this motion. But centre-changes lying within one another's fields would be drawn towards one another by the attractive

power of their migrants. For the field of one centre-change is different, at least in its relation to the centre-change, from that of every other; and its supplies are drawn from dissimilarly adjacent portions of any region of the cosmon shared by these fields.

The passage of persistent migrants from one centre-change through another centre-change should here be considered in its general aspect.

The system of supply *B* being uniform and the most symmetrical possible, certain of the migrants of the one centre-change would be identical first with certain of the displaced cosmoids and afterwards with certain of the migrants of the other; and the strength of the mutual attraction of the two centre-changes would vary inversely with the square of the distance between them.

It is important to observe that two centre-changes separated by a distance of not more than  $\frac{2U}{D}$  cosmoids could not fail to attract one another through the agency of their migrants; for any cosmoid, as *a*, of either centre-change is in a cosmic line with every cosmoid of the other centre-change; and of all these cosmic lines containing *a*, at least one must be identical with a cosmic line of migration. This means that the migrant from any centre-change which keeps to its cosmic line for  $\frac{2U}{D}$  kinemas passes

through every other centre-change that is distant no more than  $\frac{2U}{D}$  cosmoids. Hence no two centre-changes could be equidistant from a third.

Any migrant from any centre-change, as *a*, would possess a twofold attraction for another centre-change, as *c*, if it had, in the interval of its journey between the two, passed through and become a migrant of a third centre-change, as *b*, since it would possess the inducement inherent in its participation in the momentary results of two complete systems of cosmical exploration instead of only one. If *c* responded appropriately, it would find the promise of *a*'s migrant justified in the issue. If *c* failed to respond appropriately, whilst a fourth centre-change, as *d*, did so respond, *d* would have scored a point in longevity over *c*. But *a*'s migrant would doubtless be well known to some, if not all, of the cosmoids of both *c* and *d*. Moreover, this migrant must have passed through *b*, if *b* was nearer to *a* than was *c*; and since no two centre-changes may be equidistant from a third nor, therefore, bear in any way the same relation to a third, its passage through *b* must have been different in character from its passage through *a*. And inasmuch as it is a portion of, not a straight, but a cosmic line, it must bear evidence to *c* of the peculiar character of its passage through *b*. Hence both *c* and *d* would doubtless respond appropriately to the twofold inducement; and if *d* was at a greater



distance from  $a$  than was  $c$ , the inducement offered to  $d$  by this single migrant would be threefold.

It is obvious that no centre-change could overtake and pass another centre-change on its way to a third, since there could be no inducement for it to do so; moreover, there is room in the cosmon for but one centre-change at any given distance from another centre-change.

We have already proceeded far enough with our consideration of the centre-changes to become fully aware that no geometrically satisfactory image of their motions may be formed. Though they are themselves but the partially geometrical symbols of a fleeting reality, the conditions of their existence are so essentially ungeometrical in character, so completely lacking in possibilities of a direct relation to the human sense of sight or of touch, that in any "picture" that we may form of their relations with one another certain features must be absent which are invariably present in all the pictures contained in our sense experience. Nevertheless, it seems by no means impossible that further statements should be made about them, as to which statements we seeing and feeling humans might agree that certain of them were more likely to be true than others. If so, it is by no means impossible that a sufficient number of such statements should lead to an interesting guess at the nature of the correspondence, if any

correspondence exist, between the resultants of the motions of centre-changes and the motions observed in our actual life. Let us by all means enquire if any such guess is feasible. But we may never forget that, in digging into this hypothetical intermediate stratum between superficial appearances and deepest reality, such implements as sight-imagination and touch-imagination will be only occasionally, and then partially, of use.

Each centre-change — which, as a relation, we found to be equivalent to a geometrical point — is, when symbolically regarded, the centre of its universe. In front of it, or outside of it, extends that succession of cosmic rows, containing each  $\frac{2U}{D}$  cosmoids, which constitute the cosmon; and there is nothing inside of it or behind it. Hence no centre-change could be adjacent to more than one other centre-change.

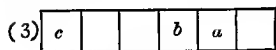
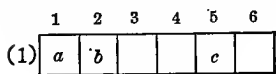


Fig. 15

But the cosmon, in its partially or potentially geometrical aspect, may not be regarded exclusively from the point of view of any single centre-change. It must instead be regarded from the point of view of all existent centre-changes.

If, then, there were at any time three centre-

changes in the cosmon, such an arrangement of them as illustrated in Figure 15 would be possible. At (1) are represented six cosmic rows from the point of view of one of these centre-changes, *a*; at (2), the same six rows from the point of view of *b*; at (3), from the point of view of *c*. From no point of view is any one of these centre-changes adjacent

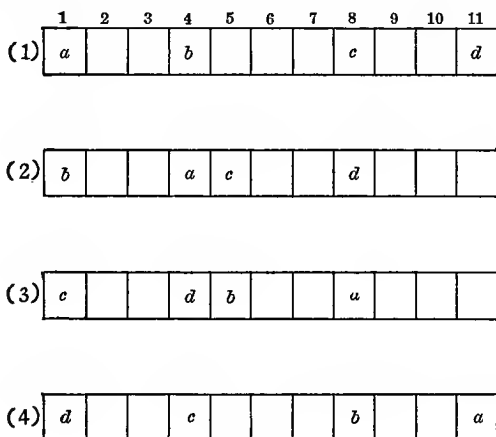


Fig. 16

to more than one of the others, nor are any two of them equidistant from the third.

Figure 16 represents a possible arrangement of four centre-changes.

But four centre-changes could not be formed in the relative positions shown in Figure 17, in which it is seen that *b* and *d* are equidistant from *c*. If *c* did not exist, *a*, *b*, and *d* might occupy the positions indicated without mutual interference.

But no centre-change could then be formed in the row 8 (from  $a$ 's point of view).

It is seen, then, that every centre-change occupies as many different positions in the cosmon as there are other centre-changes in the cosmon. But any

1	2	3	4	5	6	7	8	9	10	11
$a$				$b$			$c$			$d$

Fig. 17

given centre-change could occupy at any given moment but one position in respect of any other centre-change. If, for example, the relations of  $b$ ,  $c$ , and  $d$  to  $a$  are as at (1) in Figure 16, these centre-changes could not at the same time occupy other positions in respect of  $a$ , such as might diagrammatically be derived from (2) in Figure 16 (as in Fig. 18).

Such a folding and refolding of the cosmon, if regarded from the point of view of reality, would imply the identity of all cosmic rows, and so would demonstrate the unity of the cosmon. But a centre-change, in so far as it embodies a geometrical concept,

1	2	3	4	5	6	7	8	9	10	11
$a$	$c$		$b$	$d$						

Fig. 18

may not be identified with an ungeometrical row of free rovers nor with another centre-change, any more than I may, as a human being, be identified with my brother. Centre-changes are not realities but appearances; they are those things which the

real cosmon *would have* formed if it had endured instead of continuously dying in giving birth to new and different cosmon. Therefore centre-changes must, like human beings or atoms, be regarded numerically.

When the restrictions upon the process of free-roving had resulted in the formation of billions of centre-changes, it is clear, then, that these centre-changes must have been formed at vast distances from one another from any given point of view.

Upon further consideration of first, the diagrams (Figs. 15, 16, and 17) and, second, the attraction of one centre-change for another, — a force varying inversely with the square of the distance in cosmic lines, — we shall at once see that the centre-changes must eventually tend to gather together into stable groups, the spacing of whose members in cosmic rows would be numerically symmetrical. If the spaces between the members were always sufficiently great, both an indefinite freedom of motion and an indefinite degree of crowding together would be possible to the groups as such. Since both these privileges would imply the advantage to any group of benefiting more fully from the fields of other groups, we may conclude that those groups would eventually persist in which the spaces between members were very great and numerically symmetrical.

If we would discover other determinants of the

persistence of stable groups, we must enquire into the implications of their formation. To this end, let us ask, What may be understood by a stable group?

A stable group must clearly be a league of centre-changes separated from one another by vast distances in cosmic lines, and preserving, if not interfered with from without, the same distances from one another. This means that at the moment when the group was finally formed, all the mutually attracted centre-changes ceased to move in cosmic lines. For the reason considered in connexion with the diagrams, further approach in cosmic lines would have been dangerous, whilst withdrawal in cosmic lines would have meant the abandonment of the fullest possible benefit from one another's fields. At this point an obvious advantage lies before the centre-changes in that motion which we have termed revolution about their centres, inasmuch as, when inaugurated, it means that the centre-changes will be benefiting more variously from one another's fields than before. In this revolution must lie an important safeguard against overcrowding of centre-changes, for it would minimise the danger of too nearly identifying the field of one centre-change with that of another. The average velocity of revolution or rotation — by whichever name we may choose to call this motion of which no pictorial image may be formed — of members of a group must, then, be highest in groups in which the members

are nearest together. We shall later find reason to believe that in time all stable groups would come to have the same size, — *i.e.* the same length in cosmic lines; we may therefore conveniently borrow the term “mass” to indicate their numerical strength in centre-changes. It is, then, obvious that the members of a group of lesser mass would be farther apart than those of a group of greater mass. Hence they would gain the greatest advantage from one another’s fields — *i.e.* the same advantage that was gained in the heavier group — if their average rotary velocity was not the same as that in the heavier group, but either lower or higher in proportion to the difference in mass. Since it may be lower, it seems likely even at this stage of our enquiry that lower it would be rather than higher; and this probability will be enforced by subsequent considerations. If by  $M$  we represent mass, and by  $V$  the average rotary velocity of members, the quotient of  $\frac{V}{M}$  would probably be the same in all stable groups.

It is important to observe that those groups would survive the longest in which the character and velocity of revolution of each of their members were suited with the greatest exactness to the average of distance between it and the other members of the same group. By the character of the revolution is meant the particular succession

of disruptions and reformations of lines of supply. Any member of a group is connected with a near neighbour by all those lines of supply by which it is connected with a more distant neighbour, and by many other lines as well. Should any members ignore the obvious advantage to be gained by a precise observance of the rules suggested by the migrants arriving along these various and manifold lines, they would be forfeiting one of the most conspicuous benefits of their alliance, and the consequences of such negligence would rapidly accumulate with the lapse of time. As a result of those various and intimate relations between groups which we are about to consider, any groups whose members were not rotating in such manners and at such velocities that each one of them presented successively its  $\frac{2U}{D}$  different aspects to the cosmic row of average distance within its group, would repeatedly run the risk of destruction. Their complete extermination would be favoured by the contemporaneous existence of more efficiently organised groups, the variety of whose mutual relations would thereby be enhanced. Eventually all groups of conspicuously inferior organisation would doubtless cease to be formed.

The relative degrees of mobility eventually to be established among groups of different mass may be ascertained through a consideration of the conse-



quences of their response to the attraction of migrants.

A single migrant, as we have already seen, may not successfully orientate towards its centre-change more than one cosmoid of any given row of free rovers; for, if more than one cosmoid of each row sets out for the centre-change, a congestion of unfriendly cosmoids will eventually be produced sufficient to disrupt the centre-change and to prevent the formation of another centre-change in the same neighbourhood. The case of the mutual attraction of centre-changes themselves must inevitably be similar. This is to say, if fewer than  $\frac{2U}{D}$  migrants, or their equivalent in migrants possessing a manifold attraction, might attract one centre-change a distance of one cosmoid or cosmic row towards another centre-change, the life of centre-changes or of groups of them would be impossible in the cosmon. For it is obvious that, if centre-changes rushed impetuously to any region of the cosmon where the advantage to be gained was not commensurate with the rapidity of their approach, an otherwise moderate and beneficial degree of crowding together would become insupportable. In time it must come to be an attractive force equal to  $\frac{2U}{D}$  that would be required to induce any centre-change to make its first forward move; and a force

equal to  $\frac{2000 U}{D}$  would be required to induce a group of  $M$  1000 to make its first forward move.

A lighter group would thus have greater freedom of motion through the cosmon than a heavier: an advantage which would react beneficially upon all heavier groups with which it had relations. Heavier groups would in consequence favour the persistence of at least certain classes of lighter groups, and lighter groups would likewise favour the persistence of certain heavier groups, since a heavier group would always exploit the immediate neighbourhood more thoroughly than a lighter, whilst a lighter would always carry with it the refreshing influence of its travels.

To gain some general idea of the different classes of groups that would favour one another's contemporaneous existence, we should first recognise the advantage inherent in a process which would seem to be an inevitable consequence of the formation of groups and which we may term the association of groups.

Literal contact between the members of two groups would of course never occur; or, if it did occur in early kinemas, would result in the disruption of both groups, — an event which would possess no potential geometrical significance save in the example. In time the members of the most nearly contiguous groups would doubtless be sepa-

rated by distances as great as those existing within the groups themselves. Now, two groups that were suffered to remain thus contiguous for a sufficient period would gain a very thorough experience of one another's organisation; which experience, as it approached perfection, must result in one of three things: (1) separation, (2) disbandment of one or both of the groups, or (3) an exchange of one or more of their component members, the two groups then sharing a portion of the cosmon, and the association thus formed possessing a new advantage of longevity over the former league that was based merely upon propinquity. It is to be observed that any association involving one member of each group must entail an advantage of differentiation in the relation superior to that which would be gained by the retirement of one group to a distance from its former position equal to the distance moved in the act of association. It would, moreover, be a new kind of advantage which involved no repetition of a relation already experienced in the course of that mutual approach which had led to the relation of contiguity.

In some conceivable cases such an association would doubtless be impossible by reason of the relation borne by the internal organisation — *i.e.* the spacing and rotary velocities of members — of one of the groups to that of the other. In such cases, all other things being equal, the group whose

unassociableness with reference to the sum of other existing groups was the most marked would decline in stability, and in time its kind would cease to be formed. Contemporaneous with the decline in stability of this variety of group would be an increased advantage of mutual association to surviving groups resulting from this riddance of a stumbling-block in their path.

In other conceivable cases the association would be so readily and completely feasible that the two groups might occupy all but the same portion of the cosmon. At need one of the groups might then emerge on the other side — from its own point of view — of the other group. The lighter group could then hardly be spoken of as having lost all its old members and gained new ones, since centre-changes are in themselves geometrically alike and are, under all circumstances, continuously renewed from without. The net result of these two successive acts of association and dissociation would be that two groups already presumably suited to prevalent cosmic processes were preserved, each with increased advantages.

In any association of two groups the average rotary velocity of the members of each would increase in direct ratio with the square of the closeness of the association in cosmic lines; and the character of the revolution of each member would still be primarily with regard to its own group, but

might be indefinitely modified by the exigencies of the association. In some, perhaps all, associations the members of both groups would doubtless move apart and close up again in rhythmical vibrations similar to those which we shall presently consider in another connexion.

Close associations would probably be less common than those in which the groups shared but a small portion of the cosmon. Disruption of a close association due to some outside influence might act with explosive force upon neighbouring groups and centre-changes.

It is clear, then, that the advantage inherent in association would narrowly restrict the admissible number of contemporaneous varieties of groups. Different sets of mutually associable groups would doubtless belong to different epochs, for each set must in time exhaust its own possibilities. Recurring to our diagrams (Figs. 15, 16, and 17) and constructing in imagination groups of different mass, beginning with 1000, we must recognise that this lightest group ( $M$  1000) could not associate with all varieties of groups from  $M$  1001, 1002, 1003, etc., up to  $M$  100,000, but would probably be able to associate with only a very few of such varieties within these limits as might sufficiently generally associate with one another. The variety having  $M$  1001 might find a different set more congenial.

No variety of group would ever possess a normal

or ideal degree of stability; for it would no sooner reach the highest degree of relative stability than it would begin to decline in the scale. It is furthermore probable that certain individual groups of a variety that was rising in the scale of relative stabilities would, under certain circumstances, be forced to disband.

Though the advantage inherent in association would further favour a certain diversity in the mass of groups, it could hardly, on the other hand, favour diversity in size, — *i.e.* in the length of groups in cosmic lines, — for the advantage of the association of three or more groups would probably be greater relatively to the total mass involved, if all were of the same size, than if one of them was considerably larger or smaller than the others. Moreover, a light group that was larger than other groups of its time would doubtless be unable to keep its members in their places. A large and heavy group, on the other hand, must be difficult for other groups to associate with. It would, then, seem probable that in any given age all groups, whatever their mass, would have nearly, if not quite, the same size, and that any general variation in size from age to age would be an extremely slow process. Subsequent considerations will greatly emphasise this probability.

We may here pause to observe that, if our stable groups were in other respects equivalent to the

atoms of matter, we should say that all varieties of them were to some extent radio-active; their associations we should call molecules; and at some epoch of the cosmic life, measurable perhaps by thousands of successive nebulae, it would seem not improbable that the existent varieties should be similar in number and in character to the so-called *elements* of our experimental knowledge.

In the earliest formations of groups (it will be well to keep Fig. 16 before us) if the spaces between members were sufficiently great, this spacing might be widely different in two groups of the same mass. For example, in a certain group of  $M$  1000, a certain member might conceivably remain in a position distant relatively a million cosmic rows from the position occupied by the corresponding member of a neighbouring or distant group of like mass. Beyond a certain point, however, such differences could not exist. And if  $D$  (the length of a cosmic diameter) was sufficiently great, all groups of like mass, whether formed in the same neighbourhood or at great distances from one another, would be subject to the same limitations of spacing. On the other hand, certain other early groups might conceivably be formed in which the members were so crowded that each of them would occupy the only cosmic row compatible with the continued existence of the group. But when we contemplate the necessity of either vibration or

disruption to follow upon collisions of those groups which, though mutually attractive, were wholly or partially incapable of association with one another, and when we recognise the important ultimate benefit inherent in such vibration of groups, we shall see that only those groups might persist whose members were capable of yielding suitably before the menacing influence, and that in time all groups would come to be formed in such a way that each member of a group that was not vibrating would occupy the middle point of its admissible path of vibration. All groups of like mass and like size would then have the same spacing of members.

From these considerations it becomes clear that association cannot contain the whole story of the motives of groups; that, though a certain degree of mutual associableness would be desirable at any epoch, a certain degree of mutual unassociableness would likewise, and quite as obviously, be desirable.

In order to appreciate the significance of the vibration of stable groups and of the consequent transmission of appropriate impulses along the lines of supply of these groups, we should first try to gain some idea of the attractive force resulting in those quasi-collisions which must in the first instance set up these vibrations.

It is obvious that the attraction of one stable group for another must be very different in its



operation from the attraction of one unattached centre-change for another.

Two centre-changes lying within one another's fields and in the field of no other centre-change, and not revolving about their centres, would approach one another in cosmic lines with the same velocity, and this velocity would increase in inverse ratio to the square of the distance between them.

If a heavier group, or association of groups, or league of associations, lay within the field of a lighter group, association, or league, the velocity of each body in approaching the other would, as in the case of the unattached centre-changes, increase in inverse ratio to the square of the distance between them.

And the average velocity of the two bodies would at any time be as the total mass involved.

But the heavier body would have a lower velocity than the lighter in proportion to its total numerical superiority in centre-changes and independently of the mass of the groups or associations of which it was composed. (Cf. page 169.)

Furthermore the lines of approach of the two bodies must be quite different from the lines of approach of the two unattached centre-changes. The unattached centre-changes were not revolving about their centres; so they attracted one another in cosmic lines. In the case of two groups composed of revolving centre-changes, it would seem that no

inducement might be offered along the cosmic lines connecting the groups, no matter what relation to the velocity of migrants was borne by the rotary velocity of centre-changes. Each migrant from the revolving centre-changes of either group has been continuously twisting and turning about in the cosmon, and when it arrives at the other group, must attract it away from any cosmic line leading from one group to the other. The following migrants also attract it away from these cosmic lines but in different manners according to the successively different relative positions of their lines of emergence from the revolving centre-changes. Eventually a migrant arrives which attracts it away from the cosmic lines in a manner opposite to that of the first migrant; and, still later, one that attracts it in the same manner as that of the first migrant. But all these migrants have not alone a twisting and turning motion in the cosmon; they must have a forward motion as well, else they would never have reached another group. This forward motion of migrants, though so modified as to be incapable of attracting groups or centre-changes in cosmic lines, must nevertheless cause their successive departures from cosmic lines to bring them into cosmic rows always nearer to the source of attraction.

The above description of a spiral line of attraction may seem to be a descriptive retrogression into

the more superficially symbolical. And doubtless the spiral motion of our symbolical migrants would consist of steps forward alternating with steps to one side. Might we, then, conceive one migrant as attracting a revolving centre-change in cosmic lines, and the next as modifying the character of its revolution about its centre? But this conception must be modified when we recognise that every migrant, whether arriving in a cosmic line or not, would probably modify the character of the revolution of a centre-change, no matter what was the velocity of this revolution, by virtue of its interference with the lines of supply of the centre-change during its winding passage through the cosmon. Or, for every migrant that had failed so to interfere with a line of supply, there would probably be one that had at least twice so interfered. The amount of this mutual interference with all lines of supply would obviously vary directly with the average rotary velocity of the members of both groups, since upon this depends the degree of deflection of the lines of migration from cosmic lines. It would also vary inversely with the square of the distance. In sum, the amount of mutual interference and consequent modification of the character of revolution in both groups would vary directly with the mass of each and inversely with the square of the distance. But the inducement to the groups to approach one another varies in just this way;

hence the "spiral" line of attraction would always be the same in character, whatever the mass, or internal motions of the groups, or the distance between them. And the same spiral would be the line of all simple motions of groups in the cosmon, for all simple motions, whether resulting from an attractive pull or an explosive push, would reveal the dependence of the degrees of forward inducement and of lateral deflexion upon the same conditions of mass and distance. All complex motions of groups would, of course, be the resultants of two or more simple motions. Two groups would thus come more quickly and directly together if they were left to themselves than if one of them was subjected to an opposite pull.

In order to gain some idea of the character of this uniform spiral line of motion of groups, we must bear in mind the effect upon groups of the forward inducement of migrants. We have seen that the visit of  $\frac{2U}{D}$  migrants, or of their equivalent in migrants possessing a manifold attraction, would be required to induce any centre-change to make its first forward move; and that an attraction equal to  $\frac{2000U}{D}$  would be required to induce a group of  $M 1000$  to make its first forward move. During the period required for the bringing of this force to bear — whether this period be a single kinema or

a million — there must be lateral or rotary modifications of the group. And the greater the forward inducing force, — *i.e.* the greater the mass involved and the less the distance, — the more numerous will be these lateral or rotary modifications. The constant ratio between the two depends, of course, upon the quantity  $\frac{2U}{D}$ ; *i.e.* upon the number of cosmoids in a cosmic row, the number of cosmic lines connecting the two groups. If  $\frac{2U}{D}$  was sufficiently great or sufficiently small, — if it was such as would have made possible a system of supply adequate to the maintenance of a centre-change in the first place, — the ratio of the number of forward inducements to the number of lateral modifications would, for any given period and under any circumstances, equal one. This would mean that, for every unit of distance by which any group approached another group in cosmic lines, it would have experienced  $\frac{2U}{D}$  lateral or rotary modifications.

If the stable group or its rotating member be regarded as a solid mass, irrespectively of its changing component parts, our naming of its line of motion a “spiral” is doubtless unsuitable, since neither the group nor the member may wind in and out of that column of cosmic rows which constitute the cosmon. But “spiral” seems not so bad a

name for any *particular* aspect of its motion — for any aspect, however limited, however extended, which does not embrace its whole and exclude any implication of its parts. Let us enquire what there is in such motion that might conceivably affect the sense of sight of a seeing and thinking being who could never have perceived anything, whether in motion or at rest as a whole, that was not in the first place in continuous motion within itself, and the motion of whose parts was not being continuously modified by impulses emanating from other internally agitated things; who, after perceiving anything, could never perceive it again and call it the same thing unless it had in the interval completely changed within itself. Such a being am I undoubtedly, and such are all the others of my race.

I will assume, then, — without attempting to justify the assumption, — that the two bodies under consideration (the heavier and the lighter league of associations of stable groups) are the Earth and a tennis ball. I am standing directly between the ball and the centre of the Earth, watching the ball as it falls through the air; and I am asking myself two questions:

(1) What is there in this motion of a league of stable groups that may conceivably be giving rise to my sense-impression of the moment? — and

(2) How does this motion appear to me?

To the first question there are three possible

answers, the acceptance of any one of which means the rejection of the other two.

(a) That which is giving rise to my sense-impression of the moment is an independently rotating centre-change or succession of centre-changes which, quite apart from its rotary motion, is being drawn towards the Earth in cosmic lines by the Earth's migrants. This answer is plainly untrue as a whole or in any of its partial implications, for the very migrants which are drawing the ball to the Earth are those which are modifying the rotation of its centre-changes.

(b) The cause of my sense-impression is a solid mass of cosmon, whose internal changes bear no relation to my sense of sight and which, as a whole, is advancing towards the Earth in cosmic lines because it may not leave that column of cosmic rows which constitutes the universe. But, knowing as I do that the motion of such an inert thing has never been the occasion of any earlier sense-impression of mine, it would be the height of folly in me to suppose that the conditions of vision had suddenly changed. And unless they had completely changed I could not, in looking down these cosmic lines, perceive more than the advance guard of the tennis ball which might at any moment, so far as I could tell, be an inch or a yard away and would perhaps not differ from the advance guard of the Earth under my feet.

(c) What gives rise to my sense-impression of the moment must, then, so far as the character of its motion is concerned, be the succession of changes of position of the imperishable cosmoids in some of the centre-changes of the tennis ball: which succession of changes, when regarded in any aspect save that one which might not affect my sense of sight, is advancing towards me in a kind of spiral line,  $\frac{2U}{D}$  steps being taken in as many different directions away from the most direct line of approach, to every single step taken in this direct or cosmic line.

The answer to the second of my two questions—How does this motion appear to me?—is obvious enough. The tennis ball appears to me to be taking the shortest course between two points.

If the ball was thrown down to me from a tower, it would reach me in less time than if allowed to fall of its own weight, but the character of its line of flight would be precisely the same. It might reach me in less time than would be required to bring together two unattached, unrevolving, centre-changes which had been separated by the same distance; but its course, in so far as it might be apprehended by any sense of mine, would be far longer.

If, in being thrown, the ball was made to spin round on an axis, it might indeed reach me, but its



original spiral line would have been modified many times by another kind of force, producing motions in the same kind of line. It would therefore appear to me to be taking a longer course than the shortest I had ever observed.

If I picked up a crystal from the ground, I should know, then, that its edges appeared to me straight because I had never observed anything that was straighter; that my ability to see these edges at all depended upon their making  $\frac{2U}{D}$  departures from cosmical straightness to every unit of persistence in this straightness.

If, in sum, the Earth and the tennis ball are leagues of stable groups, it is clear that "lines" of any kind must exist only in partial sense perceptions, and that when we come to draw them about any deeper symbols of reality we are likely to get into difficulties. Nevertheless, the apparent cosmical transition from "lines everywhere" to "no lines at all" can hardly be an abrupt one; and we may soon find the idea, just now gained, of the conceivably spiral character of the straight line to be of use in our enquiry.

In connexion with the mutual attraction of groups, we should bear always in mind the necessity of regarding them from a geometrical, not an ultimate, point of view. Geometrical position is conceived by us with reference to some apparently

fixed object such as the Earth, which is not perceptibly moved by the attraction of bodies that fall through the air to its surface; and any conception that we may gain of the motions of our stable groups must be similar in character. We must remember that a stable group is, from its own point of view, the limit or centre of its universe, although from the point of view of another group it is not the limit or centre of the universe, but may, on the contrary, have groups both in front of it and behind it. In apprehending any given motion of any group we must take the point of view of the group or league of groups from which is proceeding the push or pull determining this motion. The pushing or pulling body is, in respect of the motion in question, the limit or centre of the universe; although, in respect of any motions of its own — all of which are determined from without — this point of view may not be taken. In respect of any motions that it is determining it is thus a fixed centre, no matter how rapidly it may be moving in response to other pushes or pulls in respect of which it has other bodies both in front of it and behind it.

For example, if there are four groups in the cosmon placed as at (1) in Figure 16, and the one preponderating pull comes from *a*, all the other groups will steadily approach *a*'s limit or centre of the cosmon in space 1.

But if there are two preponderating pulls in the

cosmon, one from *b* governing *a*'s motion, and the other from *c* governing *d*'s motion, *a*'s point of view as at (1) may no longer be taken in a consideration of either incident. From *b*'s point of view there are groups both in front of and behind *a*; and *a* will move away from *c*, yet towards *b*. If, in imagination, I try to identify myself with *a*, a body powerless to produce any appreciable effect upon anything in the cosmon, I find that this point of view cannot be taken. *a* exists only from *b*'s point of view; and if the incident is to have any meaning for me, I must transfer myself to *b*. When *a* has approached sufficiently near to *b* to cause *b* to move, I may take the point of view of either group in considering the motions of the other; but I may never take the point of view of either group in considering its own motions, for I could not then know them to be motions.

In respect of all the pulls in the cosmon, *a* is, however, approaching *c* instead of receding from it; and this influence of *b*'s will figure in any reciprocal influences between *c* and *a*.

If, again, there is one preponderating pull from *c* which, however, fails to reach *a*, *d* and *b* will be drawn towards one another, towards *c*, yet away from *a*. From *c*'s point of view they are as near as possible to one another, and the sum of their journeys to the centre of the cosmon will be a distance of seven. Any influence, however, that one

of them may incidentally exert upon the other will in the beginning be exerted at a distance of seven; and at any later stage of their journeys it will be exerted at a distance less than seven by twice the distance that either has covered in its approach to *c*.

No matter how many groups or leagues of them were in the cosmon, we must regard their motions thus from successively different points of view; and any comprehensive survey of mixed motions may not be compassed by a mixture of points of view, but only by an alternation of wholly different points of view which, if sufficiently rapid, will appear as a mixture.

The many implications of the mutual attraction and repulsion of stable groups remain yet to be considered. For reasons which will appear in the course of the enquiry, it seems best to undertake this consideration in connexion with our consideration of the vibration of groups. And before entering upon the subject of vibration, we may try to discover how a non-vibrating group would appear to an evolutionary being if it might appear to him at all.

To this end I will place myself in imagination in the cosmic row of average distance within a group of centre-changes which is about to take a definite and stable form, and describe some of the things I might see while there. I do not mean to suggest that I might actually see or feel a centre-change; but I do mean that I might gain some image, more

or less satisfactory, of the organisation of a group through experiments in which the sole factors were my senses of sight and touch, supplemented by instruments that were entirely made up of straight lines and curved lines. For the sake of brevity I will say that, under certain circumstances, I may actually see centre-changes. Otherwise I possess all the faculties and limitations of a human being; and I am placed in what is about to become the cosmic row of average distance within a stable group.

I will suppose that the centre-changes about to be banded together in this group have come to rest after their mutual approach in cosmic lines, but have not yet begun to rotate within themselves. It is clear, then, that I, being human, could not see them. I might perhaps see the cosmoids of which they were composed, and count all their individual changes. But collectively they could be nothing to me so long as collectively they did nothing.

As soon, however, as the centre-changes begin to rotate within themselves, I may indeed see them. If they begin at once to rotate in the manner peculiarly suited to the group, I may from my row of average distance get  $\frac{2U}{D}$  glimpses of them which might, and doubtless would, appear to me to be continuous. And if  $\frac{2U}{D}$  was sufficiently great, I

might go on looking at them to the end of my days without danger of losing any of them from sight.

Since the group is not supposed to be vibrating, each of its members must always remain at the same distance from me in both cosmic and spiral lines; for we have seen that distance in spiral lines varies with distance in cosmic lines; and we have seen that each member of a group has but one position with reference to any other member or cosmic row within the group. But we have also seen that to every unit of distance in cosmic lines there are  $\frac{2U}{D}$  units of distance in spiral lines,

no two of which are in the same cosmic line. Hence any member of my group, as  $a$ , bearing a fixed relation to me in cosmic lines must, while in motion, appear to bear a constantly changing relation to me when viewed along spiral lines — the only lines along which any motions in the cosmon might be apprehended by me. In the time required for its  $\frac{2U}{D}$  successive changes,  $a$  will appear to me to be successively at the ends of  $\frac{2U}{D}$  different spiral lines of equal length. For there must be  $\frac{U}{D}$  different

spiral lines in the cosmon; and any point in any one of them could be apprehended only in the appropriate rotary change of a centre-change. Since  $a$  must be making all possible rotary changes in respect

of my position, — *i.e.* presenting its most diverse possible aspects to the row of average distance, — it will appear to me successively as the point at a given distance from me in all possible spiral lines.

All possible rotary changes are  $\frac{2U}{D}$ ; and all possible spiral lines are  $\frac{U}{D}$ . But, though the rotation within

any stable group must be the same in character in corresponding members in the opposite halves of the group, it is clear that each member must at any given moment reach a stage of its rotation opposite to the stage reached at the same moment by the corresponding member on the other side of the row of average distance. Otherwise, — it being obvious that the velocity of migrants must be vastly higher than the highest possible rotary velocity of centre-changes, — the members of the group could not, in the sums of their rotations, be presenting to the average row their most diverse possible aspects, and so benefiting to the fullest extent from one another's fields. When *a* has made a complete rotation upon itself, it will appear to be in the same position as when it first became visible. In sum, it will appear to me to have passed through every point in the surface of a sphere of which I am the centre, and my  $\frac{2U}{D}$  successive straight lines of vision the radii.

Other members, as *b* and *c*, might appear to be

travelling at different velocities and, at any given moment, in different planes, if their rotary velocities were different, and if the successive steps in their rotations were in different cosmic lines.

It would be impossible for me to ride upon one of these apparently revolving centre-changes, but if I placed myself in the cosmic row next to one of them, it would still appear to me to be revolving about the row I had left and preserving a uniform average distance from its fellow-members, because there would be between me and it from 1 to  $\frac{2U}{D}$  units of distance in straight lines.

If my group becomes associated with another group, all its members will acquire higher velocities, and at any given moment will appear to be travelling in different planes.

The members of another group than my own will appear to me to be in continuous motion, though not upon the surfaces of spheres of which I am the centre. The members of my own group are rotating so as to present themselves to me, in my row of average distance, in their utmost diversity of character. This utmost diversity in a member that appears to me to be moving as a whole consists, as we have seen, in an apparent revolution about me as a centre. In another group whose members are rotating with regard to another row of average distance, not my own, the apparent revolution will be less diverse from my point of view and will vary



in character according to the successive apparent planes of motion. With growing experience in watching other groups I should come to divine approximately the locations of their apparent centres or rows of average distance; and when these groups were not moving as a whole, their centres, which I could not see, would appear to me fixed, even as the invisible centre of my own group appears to me fixed by reason of its being determined by the constant relations of members.

A league of groups so closely packed together, and at such a distance from me that I could not distinguish the individual apparent motions of their members, would, for the same reason, appear fixed, or in motion in a straight or bent line as the case might be.

The possible significance of differences in the velocities in cosmic lines of migrants from groups of different mass will not be considered in the course of this investigation, because no groups could be stable in which the highest rotary velocity of members was not vastly lower than one cosmoid per kinema; hence the forward velocity of any migrant must be vastly higher than any other velocity with which we shall have anything to do. All migrants from the same group would have the same velocity, for they would have passed through all its centre-changes (cf. Figs. 15, 16, 17), modified their several characters of rotation, and in turn suffered

equal degrees of modification of their lines of migration. The significance of any differences in their velocities must therefore lie beyond the scope of this investigation.

Let us now undertake that review of group-vibrations in which we were at the outset interrupted by the necessity of gaining some idea of the attractive force which must result in collisions competent to set them up.

In the first place it is important to recognise that these vibrations must be extremely slow as compared with the velocity of migrants. Every group in the cosmon is subject to many conflicting pulls and pushes; the preponderating pull or push represents at any time a proportion numerically very small of the migrants from the pulling or pushing source; and to find the consequent effect in the velocity of approach in cosmic lines we must, as we have seen, divide the total inducement of attracting migrants by  $\frac{2U}{D}$ . By the flight of an arrow we

may represent the motion of migrants; by a creeping shadow at midday, the advance in cosmic lines of a stable group at the utmost possible velocity.

Figure 16 has illustrated the necessity that any member of a group must occupy at any given moment as many positions in that group as there were other members of the group; that it must occupy as many different positions in an association as there

were other centre-changes in the association; that it must occupy as many different positions in the cosmon as there were other centre-changes in the cosmon; but that it must occupy only one position in respect of any given centre-change or cosmic row. If Figure 16 leaves any room for doubt, diagrams similar to this one and on a larger scale will make it clear that, no matter what was the value of  $D$ , no centre-change could be the member of more than one group at the same time.

It is obvious that the near approach of groups, at either accelerated or retarded velocities, must entail a growing menace to the integrity of both groups, whether they had the same or different masses and velocities of approach. For the members of each group are rotating with regard to the average row of their own group; and modifications of this primary rotation beyond a certain strength must disrupt the group. Even if they at once recognised their associative possibilities, — as they would do if their earlier experience of such associations was sufficiently large, — there must still be a certain degree of menace both before and after the formation of the association. If the two groups were mutually unassociable and came together at a sufficiently high velocity, they would, if not otherwise interfered with, rebound from one another. This mutual repulsion would not begin at so early a stage of the collision when that epoch in the cosmic life

had been reached in which a repeated and universal experience of the advantage of differentiation inherent in the vibration of groups had resulted in the survival of those groups alone whose members hung mobile in the middle of their admissible paths of motion within the groups. If the stable groups of any epoch were each a billion cosmic rows in length, each member of a group of  $M$  1000 might have an admissible path of nearly a million cosmic rows. We should remember that the ratio of mass to size would, on the other hand, be limited by the necessity that members of a stable group be kept in the same average positions in the group without risk of being attracted forth into the cosmon. But if  $D$  be sufficiently great, many different sets of groups are readily conceivable which would remain absolutely impregnable to one another's assaults until such time as the systematic exigencies of their component members should impose the successive disbandment of individual groups of any variety or of entire varieties of groups in favour of new varieties.

Such disbandment, in the case of the heavier groups and associations of groups — each of whose members occupies as many different positions in the group as there are other members — must be a somewhat complicated process. In some cases the centre-changes might leave their group in various manners according to their former positions in the group. Some of them might be banded together

in lighter groups that were more or less markedly unsuited to the prevalent cosmic activities and must therefore in time be subdivided or combined with other such groups. Other members of the original group might depart singly into the cosmon at a velocity so high — though, as compared with their migrants, they would have but a snail's pace — that each of them in turn must be accepted as a member of the first group it encountered, whilst one of the original members of that group was driven from it at a corresponding velocity. All the different consequences of the disbandment of a group must be productive of disturbances similar, in their effect upon other groups, to the vibrations of groups arising from collisions.

The members of any group, upon collision with another group, must move towards that cosmic row which is at the least average distance from them all, the group being in consequence reduced in length. This motion would be in the usual spiral line, and its velocity in cosmic lines would be very low as compared with that of migrants. To each unit of distance moved by each member in cosmic lines, there would be a complete rotary modification of its primary rotation of value  $\frac{2U}{D}$  in units of distance.

All the lines of supply would be disturbed by this mutual approach of members just as they had been by the mutual approach of the two groups; and this

disturbance could be compensated only by an eventual opposite disturbance in the form of a general recession of the members from the cosmic row of average distance to cosmic rows as distant respectively from their normal positions in the group as these normal positions were from the most central positions that had been reached. If the original disturbing cause was removed, this compensation would be at once effected, and a series of opposite and compensative motions would follow, diminishing in extent as the inertia of the group permitted its regaining that form in which consisted its highest intrinsic stability.

The net results of the collision would have been the spirally linear vibration of the two groups,  $\frac{2U}{D}$  side motions to 1 forward; the similar spirally linear modification of all their lines of supply; and the consequent spirally linear vibration of all other groups reached by these lines of supply.

The amplitude of the original vibrations would be as the intensity of the force setting them up — *i.e.* as the mass of the groups into their velocity in cosmic lines — and inversely as the mass of the groups. The amplitude of the responsive vibrations in other groups would be as the mass into the amplitude of vibration of the originally vibrating groups, and inversely as their own mass and the square of the distance.

In any groups the vibratory rates would vary with their mass, but would probably, in the case of vibration proceeding from a single cause, be independent of the amplitude of vibration; because, if the members travelled far inward on their paths, they would repel one another the more forcibly and would acquire a proportionally higher velocity. The highest velocity of vibration must, as we have seen, be very low as compared with the velocity of migrants. A vibratory wave travelling through the cosmon might, then, be conceived as a series of a thousand modifications of the lines of supply, between every two of which modifications was a length of billions of cosmoids of unmodified line.

These modifications must all have been subject to the primary rotations of the centre-changes. That is to say, though they could never be lost nor diminished in intensity, their passage through each centre-change must have been delayed or accelerated according to the successive primary rotary velocities of these centre-changes. And Figure 16 shows us that every linear modification proceeding from a group must pass through each of its members. For the motion of any member in its vibratory path must be regarded not from its own point of view, but from the point of view of those other members which are disturbing its lines of supply. From the successive points of view of all members of the group — *i.e.* from the point of view of the

group as a whole — each member must, then, receive the vibratory impulse from every other member, modify its velocity and character, and suffer modification by it in return. The wave proceeding from the group as a whole would be the resultant of all the several modifications of lines of supply by its members. Since the vibratory rate of the group is independent of its amplitude of vibration, the wavelength would always be the same; but the wave strength — *i.e.* the total number of modifications within a given lateral distance — would vary with the mass and with the amplitude of vibration.

Since both the primary rotary velocity and the vibratory velocity of members vary with the mass of the group, the velocity of the waves in the cosmon must be the same whether emanating from a heavier or a lighter group. That the waves would always have the same velocity when emanating from a group having successively different amplitudes and consequently different velocities of vibration, will appear from the following consideration of a certain condition of vibration in groups.

The members of a stable group, in slowly closing up towards the row of average distance, must continuously increase their primary rotary velocities with the squares of the distances; else the peculiar organisation of the group could not be preserved, and the group must cease to exist as such. The compensating elongation of the group would be



accompanied by a corresponding decrease in rotary velocities. During the last half of the outward journey of a member, both the linear and the primary rotary velocity would be approaching the minimum. During the first half of the inward journey both velocities would increase. During the last half of the inward journey the linear velocity would again be approaching the minimum, but the rotary velocity would be approaching the maximum. During the first half of the outward journey linear velocity would increase and rotary velocity diminish. Since the rate of increase and decrease of both velocities varies with the mass of the group, the ratio between the two average velocities in any complete vibration would always be the same in any group independently of the amplitude of vibration. And each wave of modifications, as a whole, would then preserve the same velocity.

In considering the effect upon groups of the passage of the modifying waves through the cosmon, we must bear in mind the spiral character of these waves and of the vibrations that give rise to them. Unlike the long spiral lines of supply of rotating centre-changes, these waves or series of modifications of the lines of supply travel in spirals consisting each of  $\frac{2U}{D}$  lateral movements to 1 forward movement.

It would seem, then, that each modification of any

line of supply must, in consequence, upon reaching any group, cause a corresponding modification of the character of rotation of every member of this group and then pass on into the cosmon beyond, with an undiminished power of exerting a similar influence upon any other groups that did not lie beyond the end of the line of supply. Such modifications would, then, set up in any group a spirally<sup>1</sup> linear vibration which would contain no possible implications of a perilous congestion of groups. Or if, for any reason, the waves might not alter the relative positions of members in cosmic lines, they would still alter their rotary positions.

But certain considerations make it evident that not all groups would be in a position to respond to the vibratory inducement emanating from any given group and passing through a second group.

At (1) in Figure 16, let *b* and *c* be vibrating groups and let *a* be an unallied centre-change. Let us enquire in what ways *a* may respond to the vibratory inducements emanating from *c*.

Whatever the mass and vibratory amplitude of *b* or *c*, *a* may, under certain circumstances, receive simultaneously certain waves belonging peculiarly to *b* and certain other waves which belong peculiarly to *c*, but which, on their journey to *a*, have modified

<sup>1</sup> By spiral will always be understood henceforth the spiral of ratio 1:  $\frac{2U}{D}$ , which is the line of motion of everything in the cosmon save the individual cosmoids themselves.

the vibratory character of *b* and proceeded on their way with their modifying power undiminished save with the square of the distance in cosmic lines.

But if one of *c*'s waves — *i.e.* one set of vibratory modifications — coincides with one of *b*'s waves at the moment of its arrival at *a*, *a* will undoubtedly lose the vibratory inducement from either *b* or *c*. This coincidence could not amount to a reduplication similar to the twofold inducement of attractive migrants each of which visits but one change in a centre-change and, if possessing a manifold inducement, must exert it variously upon the visited and adjacent changes according to their various relations to the attractive influence. A vibratory wave, on the other hand, travelling in spiral lines, implies a succession of modifications of every change in every centre-change through which it passes. There would be room in any centre-change for an indefinite number of such waves of the same or different strength at the same time; but the complete coincidence of any two waves of like strength could have but a single effect, since in visiting together all portions of the centre-change, they must offer the same inducement to any given change. Similarly, the coincidence of one wave with a portion of another wave would mean that the effect of the weaker wave was lost.

This coincidence of the waves from *b* and *c* will take place in *a* if *b* occupies the same rotary position

relatively to a certain future position of  $a$ 's, as is represented by the modifications which  $b$  is receiving from  $c$ . In other words, if  $c$  was undergoing precisely the same set of rotary changes relatively to the future set of rotary changes in  $a$  at the moment of emanation of the wave as is  $b$  at the moment of receiving it, the weaker vibratory wave will at  $a$  be merged in the stronger; and  $a$ 's response will be as to  $b$  alone, if  $b$ 's wave is the stronger, containing all of  $c$ 's wave and other modifications besides.

If the waves from  $b$  and  $c$  do not reach  $a$  at the appropriate moment, they will not coincide; for it is with reference to the rotary changes in  $a$  that  $b$  and  $c$  may occupy the same or different positions in respect of  $a$  in addition to their difference in distance in cosmic lines. All modifications in these two waves have been approaching  $a$  in spirals the same in character ( $1: \frac{2U}{D}$ ) though inevitably different, so far as  $a$  is concerned, in the particular succession of lines of supply affected in all but one of any  $\frac{2U}{D}$  successive cosmic rows through which they may pass. For every cosmic row.—consisting, as it does, of portions of cosmic lines — is by assumption different from every other cosmic row in respect of any centre-change or group in the cosmon. And the difference between any given row and an adjacent row is less than between the given row and

a row next but one to it. Hence any simple spiral line in the cosmon involves, in its passage through successive cosmic rows, successively the least possible differences in adjacencies of cosmoids. Since, at the end of  $\frac{2U}{D}$  such departures from its original character, it must return upon itself, it follows that the cosmon consists of  $\frac{2U}{D}$  cosmic rows, and contains  $\frac{U}{D}$  different simple spiral lines, each line having two opposite directions corresponding to the opposition between the two cosmoids constituting any change.

Now, any two waves from  $b$  and  $c$  respectively have originated in two different portions of the cosmon; and, so far as  $a$  is concerned, they consist in successive modifications of  $a$ 's lines of supply always, be it remembered, by migrants travelling in long spirals (not  $1: \frac{2U}{D}$ ). Their presence in  $a$  is best conceived — as described above — as spiral waves ( $1: \frac{2U}{D}$ ) visiting every change in  $a$ , and their influence upon  $a$  must inevitably correspond to this conception. But their coincidence or divergence in  $a$  obviously depends upon the particular winding course that  $a$ 's lines of supply may be following in the cosmon; *i.e.* it depends upon the primary rotary character of  $a$ . If  $a$  has at all times any given

rotary character, there is but one row in the cosmon in which *a* may lose the vibratory inducement from *c*. Conversely, if *a* occupies at all times a given cosmic row, it may lose *c*'s inducement only provided it have the appropriate rotary character. If it lost it while occupying space 1, — at (1), Figure 16, — it could not lose it while occupying the same rotary position in space 2, although it would lose it while in space 2, if occupying the appropriate rotary position.

Immediately upon leaving *a* (in space 1) the joint wave will be split up into the *c* elements and the *b* elements for the benefit of any imaginary centre-change adjacent to *a* and bearing the same rotary relation to *b* and *c* as was borne by *a* upon the arrival of the wave at *a*. Such a centre-change would respond to both waves, and the character of its response would be suited to its position just one row removed from the dead row occupied by *a*. It would also respond to any imaginary wave from *a*. Similar centre-changes situated at distances of two, three, four, etc., rows from *a* would respond to all three waves, according to their positions in cosmic rows.

Now if *a*, instead of being an unallied centre-change, is a member of a vibrating group; and if the spiral line of *a*'s vibratory path is that one of the  $\frac{U}{D}$  possible spirals which ensures its having the ap-

propriate rotary position relatively to  $b$  in each successive row occupied along this path, it will continue throughout the vibration of its group to be dead to  $c$ 's influence, no matter what may be the velocity of this vibration. And  $a$ 's vibratory path would indeed be this particular one if  $a$ 's and  $b$ 's positions in the cosmon had been determined solely by  $c$ , — if, that is, they had been brought into these positions by the attraction or repulsion of  $c$ 's migrants,  $\frac{2U}{D}$  side motions to 1 forward. If, now, by

$a$  we represent the whole group instead of a single member, it is obvious that under the assumed conditions — *i.e.* the establishment in the first place of  $a$ 's and  $b$ 's rotary positions by  $c$  — complete coincidence of the  $b$  and  $c$  waves will continue throughout the group  $a$ , no matter what may be the distance between the three groups. And the velocity of these waves will not be modified by their passage through  $a$ , since it is the same as  $a$ 's vibratory rotary velocity. (Cf. page 200.)

So long as  $a$  and  $b$  remained at the same distances from  $c$ , the successive waves from  $c$  would maintain constant amplitudes of vibration in  $a$  and  $b$  which would be increased or diminished only upon a corresponding increase or diminution in  $c$ 's amplitude of vibration, or upon motion of one of the groups as a whole, or upon the intervention of some outside influence.

If *a* and *b* began to move towards *c*, the successive disruptions and reformations of lines of supply would be the same in *a* as in *b*, for they would in each case be governed by *c*'s migrants whose lines were, in turn, determined by the character of *c*'s complete rotation. More migrants and more vibratory modifications from *c* would reach *b* than would reach *a*; and, in the case of *a*, vibratory modifications would be missing in the same lines of supply in which migrants were missing. *b* would travel more rapidly than *a* and would have a greater amplitude of vibration; but, inasmuch as neither of them could ever move forward into a new cosmic row without having suffered  $\frac{2U}{D}$  lateral attractive modifications at the hands of *c*'s migrants, each advance of theirs in cosmic rows would be determined by the complete rotary character of *c*. During their entire journey, therefore, every vibratory wave from *c* would, upon reaching *a*, be merged in the presumably stronger wave from *b*.

If *b*'s vibration had originally been set up by some larger and more distant body than *c*, as *d*, occupying a like rotary position, *a* would be responding indirectly to *c*'s influence as transmitted by *b*. But all other things equal, — and we shall later consider some of the other factors in such situations, — *a*'s amplitude of vibration must be less than if *a* and *b* were occupying different rotary positions, and *a*



was in consequence responding to both direct and transmitted waves from *c*. The process of transmission of waves would obviously be slower in proportion to the number of groups by which they were successively transmitted; for the inertia of centre-changes would prevent any group from attaining at once to its maximum amplitude of vibration in response to any given vibratory influence.

We have now to consider the effects upon a stable group or league of groups of a mixed attractive inducement, — *i.e.* of the conflicting inducements proceeding from two or more bodies having different rotary positions.

Differences in rotary position are inevitable in the symbolical cosmon, and their origin lies in the conditions under which stable groups are formed, — *i.e.* in the differences in mass and the implied differences in character of primary rotation. The consequent differences in induced rotation would, of course, be cumulative; and, to find the rotary position of a group at any time, one must know the history of all the influences to which it has ever been subjected. We have already seen that the history of positions of a lighter group would be longer than that of a heavier.

In Figure 16, let *d* have a different rotary position from *c*'s, and let *b* be subject to both their attractive influences. *b* will then have acquired a new rotary position; and there will no longer be a complete merging at *a* of *c*'s vibratory wave in *b*'s.

Leaving *a* henceforth out of account, we shall see that if *b* approaches *c* and *d*, all the migrants attracting it, though increasing in number, will steadily lose more and more of their attractive power since each migrant, though attracting *b* forward in cosmic lines, is at the same time attracting it in a spiral that is peculiar to either *c* or *d*. The *c* elements will always be at war with the *d* elements; *b*'s motion will be ever slower in proportion to the number of migrants reaching it, — *i.e.* more migrants will be required to produce a given advance in cosmic lines or change of rotary position; and the spiral line of *b*'s motion will be the resultant of the two influences.

If the two influences are always equal — we shall see presently how this would be possible — in migratory strength at *b*, neither may cause *b* to swerve farther and farther from the other's simple spiral. *b*'s line of motion will then be a simple spiral line intermediate between the other two.

Moreover, the *c* and *d* influences being always equal, *b* may never arrive either at *c* or at *d*. Nor may it approach beyond a certain point without being rent in twain. If it is a sufficiently stable group, or league of groups, successfully to resist this disruptive tendency, it would seem that it must come to rest at that point where the migrants from *c* and *d* were present in sufficient force to prevent any further advance towards either body. But, under

certain circumstances, such a sudden stoppage of *b*'s progress would create in *b* a disruptive tendency quite as great as was created by the conflict between *c*'s and *d*'s migrants; for it would require that all of *b*'s lines of supply (in number  $\frac{2U}{D}$  taken as many times as there were centre-changes in *b*) should immediately undergo a change far more radical than any that was imposed during its accelerated or retarded approach. That is to say, the period during which all the centre-changes composing *b* would remain disrupted awaiting material suitably placed for reformation would be far longer than it had been at any stage of acceleration or retardation. And if this period of disruption was sufficiently prolonged, it is obvious that the gathering material for centre-changes must be split up into two classes in one of which *c*'s influence would prevail over *d*'s, whilst in the other *d*'s would prevail over *c*'s.

We may surmise that at an early stage of cosmic experience such a group or league of groups as *b* would, under these circumstances, be disrupted. But stability of a group or league of groups constitutes, as we have seen, a universal advantage. Hence groups and certain leagues of them would doubtless come in time to invalidate this disruptive menace in the same manner as in their associations and internal vibrations: to wit, through a compensating modification of the primary rotation of

the group or of the secundo-primary rotation of the league. For, once the field of a centre-change is established, there must always be an abundance of material at hand for its renewal, if the superiority in velocity of migrants over the highest possible velocity of the centre-change in rotation or in spiral motion is as great as we must believe it to be. The menace contained in the situation described above lies not in the lack of material, but in the sudden and radical rearrangement of this material at its border. A displaced cosmoid arriving from a distance of  $\frac{U}{D}$  cosmoids might not enter the centre-change by a line of supply only two cosmoids long or by a line which would bring it into a familiar adjacency to a familiar cosmoid without creating a menace to the system of supply of value 2 over  $\frac{2U}{D}$ .

But all lines of supply are mutually though differently adjacent. Hence, if *b*'s members continued to rotate in part as if they were still advancing in the intermediate simple spiral at a velocity retarded sufficiently gradually; if, that is, they continued so to rotate in all respects save of those lines of supply connecting *b* with *c* and *d*, — which lines must, in any conceivable instance, be exceedingly few in number as compared with the total number of lines of supply; and if, in respect of these lines of *c*'s and *d*'s, they continued to rotate in that manner, unvarying as

to position and velocity, prescribed by the conflict between *c* and *d*,—*b* would avert its own disruption, provided the conflicting inducements from *c* and *d* did not exceed a certain strength.

A rotary vibration would thus be set up in *b* along the intermediate simple spiral line; and the length of its path in lateral distance, the period during which it would continue, and the rate of shortening of the path would depend upon the distance and mass involved and upon certain other features of the situation which need not here be considered. Throughout this vibration *b* would occupy the same position in cosmic rows, and the attractive inducements of both *c* and *d* would remain constant. But at successive stages of the vibration any influences, attractive or vibratory, exerted by bodies other than *c* and *d* would have successively different strengths in *b*. The number of migrants received by *b* from any fixed body whatsoever would remain constant, but successive migrants would find *b* occupying successively different rotary positions, redundant in the sum, for responding to and for neutralising their influence—with this exception: that they would always find the opposition of *c*'s and *d*'s migrants the same. Vibratory waves travelling in spiral lines, whether from *c* or *d* or any other body, would encounter similar differences in *b*; and *b*'s amplitude of vibration in response to such waves and its opportunities of eliminating waves through coincidence

would vary precisely as if it was travelling up and down a simple spiral line which extended through successive cosmic rows. The actual spiral line of vibration would, of course, parallel itself in successive rotations with successively the least possible differences of adjacency corresponding to the differences of its course through successive cosmic rows.

The rotary vibration described above seemed an obvious one to select for the presentation of certain factors which would be present in all rotary vibrations. Doubtless such vibration of a group or league of groups in a simple spiral line could not take place in a cosmon that contained a great number of groups occupying different rotary positions. The description of another kind of rotary vibration will possess greater significance in this enquiry.

If the two influences to which *b* is subjected have different rotary positions and *unequal* strengths, the stronger will cause *b* to swerve farther and farther from any simple spiral line similar to the weaker's. Hence *b*'s motion will not be in a simple but in a bent spiral. If these two influences are persistent, *b* will travel in the bent spiral line to a position near the body which is exerting the stronger influence, there to be brought to rest; and the changes then wrought in it by the weaker influence will depend upon a variety of circumstances, some of which are presently to be considered in connexion with another aspect of these induced rotations in groups.

But if the stronger of these two influences is removed while  $b$  is still travelling in the bent spiral line, a new kind of rotary vibration, or secondary rotation, may be set up in  $b$  in a bent spiral line. After a sufficient number of departures from the original simple spiral, this bent spiral line must return upon itself. This new vibration, or — to use a term perhaps more suitable — secondary rotation, will thus be redundant even as was the vibration in a simple spiral path. And though  $b$  of necessity remains fixed in cosmic rows and occupies always the same rotary position in respect of both the attractive influences, it must during any complete rotation occupy as many different rotary positions in respect of all other influences as there are swervings from the original simple spiral represented in the relation between the two determining influences. Eventually  $b$  will be drawn to the borders of the body from which is proceeding the persistent influence; and the time required for it to be brought thus to rest will depend upon  $b$ 's mass — *i.e.* the total number of its centre-changes — upon the relation between the two influences, and upon the distance. But the relation between the two influences remaining constant, the bent spiral of  $b$ 's rotation will always be the same in character, no matter what may be the distance between  $b$  and the attracting body. And since each swerving from the spiral of the stronger influence (now removed) must be towards

the spiral of the persistent influence, and since but two influences are involved — instead of the  $\frac{2U}{D}$  influences involved in the primary rotation of a group (see page 190), — it seems that, if the relation of mass to distance was such as to make possible a redundant rotation in the first place, the bent spiral of *b*'s rotation will, in respect of all other influences in the cosmon, be a circular or elliptical orbit. If, then, *c* is the body exerting the persistent influence, vibratory waves from a suitably placed third body, as *a*, will at one stage of the rotation be eliminated at *c* through coincidence with *b*'s waves, whilst at the opposite stage of the rotation they will be eliminated at *b* through coincidence with *c*'s waves, — *b* remaining always between *a* and *c* in cosmic rows, but *c*'s waves having opposite directions in *b* at opposite stages of the rotation.

The character of such bent spiral lines of rotation may vary indefinitely — in accordance with the relation between the influences establishing them — in the particular simple spiral lines swerved from and in the distance travelled in simple spiral lines between each pair of swervings.

If two bodies, as *b* and *c*, are subject to repellent influences respectively from two dissimilarly placed bodies, as *a* and *d*; and if these repellent influences are removed, — *b* and *c* will continue to advance in simple spiral lines at constant velocities until some



other influence supervenes to modify the particular systems of disruptions and reformations established by the pushes from *a* and *d*. If *b* and *c* come into one another's fields, a secondary rotation in a bent spiral will be set up in each of them with reference to a row of average distance between them. In respect of all other influences in the cosmon they will then be revolving about one another; although in cosmic rows they may be advancing at a different velocity from that of the revolution or they may early have come to rest. Their position in cosmic rows, as well as the length of their paths of revolution and the duration of this revolution will of course depend upon their mass and upon the relation of *a*'s position to *d*'s.

It is obvious that motion in a simple spiral line in response to a push from a given body will be the opposite of a similar motion in response to a pull from the same body. For, if the push gives place to a pull, all modifications must retrace their steps through all the centre-changes of the attracted body. Now, if *b* is subject only to the influence of *c*; and if, for any reason, *c* must both repel and attract *b* at the same time; if *c*'s repellent influence is removed while *b* is still within *c*'s field, — *b* will, in coming to rest in cosmic rows, enter upon a secondary rotation similar to the last but one considered. By virtue of the exact opposition between the two influences establishing this rotation, *b* will in respect of all

other influences maintain the same distance from *c* in all its swervings from simple spirals. And these swervings will be continuous; *i.e.* *b* will never travel in a simple spiral line.

The character of these bent lines of rotation or revolution will become clearer when we have further considered the implications of differences of rotary position in the cosmon. This consideration should now be undertaken in connexion with that other allied class of induced rotations of leagues of stable groups, — to wit, rotations upon axes.

We should remember that the members of a stable group that is subject to no outside influence are rotating within themselves in different manners and at different velocities with regard to the cosmic row of average distance within their group. Though, when viewed from without, there might conceivably be more members on the hither side of the average row than on the farther side, or *vice versa*, the amount of rotary motion — *i.e.* the sum of the rotary changes in any given period of time — on the one side of it must equal the amount of rotary motion on the other side. And the character of the rotary motion on the one side must be the same as its character on the other side, this character being dependent upon the mass of the group. But at any given moment the rotary motion must be, not the same but as different as possible in the two halves of the

group; *i.e.* for every line of supply in the one half disrupted and reformed at any moment in any given relation to a given cosmic line, there must occur at the same moment in the other half the disruption and reformation, in the same relation to this given cosmic line, of a line of supply whose adjacency to the line of supply corresponding to the line disrupted in the opposite half of the group is as different as possible relatively to the uniform character of rotation within the group; otherwise all members could not be presenting to the average row their most diverse possible aspects. (Cf. pages 166–168.) Thus if *a* and *d*, representing the opposite and outermost members of a group, exactly balance one another in rotary motion, — as it seems likely they would do, and as it will in this enquiry be convenient to assume that they do, although any more complex balancing of the two sides of a group would in no way affect the results of the enquiry, — any given modification of any given change in *a* will be duplicated in *d* only at the end of one-half of a primary rotation of either member.

Now if this group, formed no matter how, is for the first time in its career subjected to an outside attractive influence, it may begin to move towards the attractive source in a simple spiral line. Let us suppose that it is for some reason debarred from changing its position either in cosmic rows or in successively different spiral rotations, — as might

indeed be the case when a sufficient number of groups had been formed, — and let us consider the internal or lateral modifications which are caused by the attractive migrants and which, so far as we may now see, could never be suppressed by any outside influence.

Each member and the group as a whole will have acquired a position in the cosmon determined by the primary rotary position of the outside attracting body, or by its primary rotation modified by a secondary rotation set up by some outside influence. That is to say, each member of the group has been given a new rotation or series of modifications of its primary rotation, redundant in the sum, and taking place around its centre or with reference to any given cosmic line. Within a certain period of time each change in each member will be modified by a migrant from the attractive source; and in view of the vast superiority in velocity of migrants over the primary rotation, it seems highly unlikely that one change would be modified oftener than another.

The period required for a complete secondary rotation of all members of the group will depend upon the migratory strength of the attractive influence and also upon the mass of the group, — *i.e.* upon the total number of lines of supply to be modified. For a migrant offering a single lateral inducement may not produce a lateral modification in each member of a stable group, but may produce only one

such modification in the group. (Cf. pages 169 and 201-203.) And all modifications of the primary rotation of a group must be kept uniform throughout the group; otherwise the peculiar character of the group is lost, and the group must cease to exist as such. The establishment of a primary rotation in the first place was the mark of the flexibility of the rotation of centre-changes; and in the case of induced rotations as in the case of vibrations, the concerted action of the allied members will avert any cumulative distortion of the group such as would arise from differences in their rotary velocities. The other menace of such distortion would be constituted by differences in the migratory strength of the new influence at the different members of the group. There can be no doubt that in any group which might in the first place have acquired the stability presumably inherent in an alliance dependent upon the system *B* (Fig. 14) the secondary rotary velocities of all members would always be the same; and this velocity would be as the mass of the attracting body and inversely (1) as the mass of the attracted group and (2) as the square of the distance.

We may here observe that in a league of stable groups whose members had a secundo-primary rotation with reference to the average row of the league this secundo-primary rotation would doubtless, up to a point, be capable of equalising the ve-

locities of induced rotations. But there could be no demand for, nor advantage in, an equalisation of vibratory velocities. Vibrations are not cumulative in their influence upon any motions in spiral lines, and contain no menace except in their amplitude of the moment.

The line of any secondary rotation of a group is a certain one amongst the  $\frac{U}{D}$  simple spiral lines each of which, beginning in one of the two outermost members of the group, passes through all the changes in this member in a succession peculiar to itself, pursues that course through every other member which belongs to that member's position in cosmic rows, and ends in the opposite outermost member. And the rotation takes place not around another simple spiral line — for there is as yet but one, — but around any given cosmic line.

The secondary rotation of all members is of course the same in character and in velocity; but at any given moment it must reach opposite stages in the opposite halves of the group.

It is to be remembered that this rotation must be regarded from the point of view of its cause; hence there are two outermost members, and other groups may be formed on the far side of the farther of these two outermost members.

It is furthermore to be remembered that, vast as are the distances in cosmic lines separating the

members of a stable group, they are exceedingly small as compared with the lateral distances  $\left(\frac{2U}{D}\right)$  contained within each member. Diagrams are of course inadequate as illustrations of the unknown relations between these distances; nevertheless, we may find it of use to keep before us Figure 19,

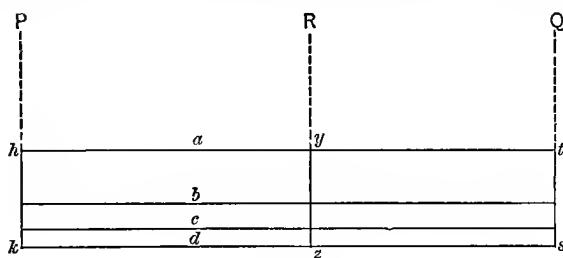


Fig. 19

in which the horizontal lines  $a, b, c,$  and  $d$  represent the outermost and two other members of a group, the line of whose secondary rotation,  $hk$ , is  $\frac{2U}{D}$  times as long as it appears to be in the diagram.

It is obvious that if the secondary rotation could have a velocity sufficiently high, the group would be disrupted,  $a$  and  $d$  being the first members to depart. Inasmuch as the stable group is probably more stable than any association or league of groups, and inasmuch as the numerical inferiority of any conceivable migratory inducement to the quantity  $\frac{2U}{D}$  must be very great, it is hardly supposable that

disruption of a group should thus be brought about unless the group was already on the verge of disbandment. But disruption of a weak association or league of associations might be brought about by migrants from one or from many sources. The disruptive tendency produced in any group by rotation would be stronger if the group was at the same time in a state of vibration. And it would imply a tendency in *a* (Fig. 19) to move slowly away from *b*, and in *d* to move away from *c*. If *a* and *d* might actually move thus away from the average row either in cosmic rows or in rotary positions, they would by so much weaken the tendency in *b* and in *c* to move away from the average row.

The situation of our group may, for present purposes, be summarised as follows:

The group has but one position in the cosmon. Any given spiral motion whatsoever within the group will take place in *d*'s half of the group, the space of just half a rotation later or earlier than in *a*'s half. *d*, though receiving more or fewer migrants from the attractive source than *a*, will respond to them in the same degree because of primary rotary modifications preventive of a cumulative distortion of the group.

As such, the group's situation can have no significance in a consideration of simple spiral lines, for there is but one such line in the group; it is the same in rotation and in vibration and independently.



of the velocity of either; there is no spiral line in the cosmon with reference to which it may be apprehended; and there is no body upon which the rotation of the group may exert any measurable influence in spiral lines. Or if another attractive influence be exerted by a body occupying a like rotary position, the situation of the group will still possess no significance.

But let another attractive influence be exerted upon the group by a body occupying a rotary position *different* from that of the first attracting body, and the situation of our group at once acquires significance in any consideration of spiral lines.

We have assumed that for some reason this group might not respond to this mixed inducement by motion through successive cosmic rows or by those successive changes of rotary position which are tantamount to changes of position in cosmic rows. In less simple instances of rotation than the one under consideration a group might well be debarred from any change of position as a whole; for, long before two groups could come near to occupying the same rotary position (no matter how great the distance between them in cosmic lines) they would both be disrupted by their excessive modifications of one another's primary rotations. (Cf. page 195.) Hence, any group restrained from changes of rotary position as a whole by the proximity of other groups or by any other factor in its situation must, when

subjected to a mixed inducement, enter upon a secondary rotation or rotations within itself; any such rotation being redundant in the sum and following always the same course — *i.e.* involving no successive differences of adjacency — in any given member of the group.

Let us suppose the original attracting body, or *P*, to occupy a rotary position as different as possible in respect of our group — no matter what may be the distance in cosmic lines — from that of the second attracting body, or *Q*, whose line of rotation in the group is represented in Figure 19 by the vertical line *st*. In the diagram *st* is drawn parallel to *hk*, yet we know that throughout its course it must be as different from it as it is possible for one simple spiral line to be different from another. That is to say, the two lines are opposites. The succession of rotary modifications in any centre-change along the line *st* will be the reverse of that along the line *hk*; it will be that succession which would be followed by the *P* influence if this was a repellent instead of an attractive influence. Hence the rotary modifications proceeding from *Q* must always be the opposite in both *a* and *d* of those proceeding from *P*. And, the velocity of migrants being of necessity so vastly superior to the highest possible rotary velocity that the difference between these velocities must be left out of account in the consideration of any group or league of groups of a size and

mass conceivable (in view of Figs. 14 and 16) in the cosmon, the modifications from either  $P$  or  $Q$  must at any given moment find  $a$  and  $d$  at opposite stages of their uniform primary rotation.

It is readily to be seen that, if these two rotations have the same velocity, neither can have any effect upon any motions in spiral lines either inside or outside the group. Each modification along the line  $hk$  will be offset by an opposite modification along the same line (*i.e.*  $st$ ), and the group's position for responding to any vibratory waves or to any attractive migrants from any source whatsoever cannot be altered at any stage of the rotation.  $a$ 's primary rotation will continue to be always before or behind  $d$ 's by the space of half a rotation of either. But  $a$  and  $d$ , while rotating solely with reference to the average row, were unable either to move in spiral lines or to generate vibratory waves. When their primary rotations are thus modified from without by equal and opposite influences, there can therefore be no successive differences in their rotary positions possessing implications in spiral motions.

But if one of the attractive influences — say  $P$ 's — is stronger than the other, the secondary rotation along the line  $hk$  will be quicker than that along the line  $st$ , and a resultant rotation will be derived which will always be the same in character though varying in velocity with the degree of inequality of the strengths of  $P$  and  $Q$ .

For it is obvious that the resultant rotation cannot take place along a simple spiral line. Opposing modifications from  $Q$  are always present in the simple line,  $st$  or  $hk$ , and they must at all times render this an impossible line of rotation unless  $P$ 's strength is more than  $\frac{2U}{D}$  times as great as  $Q$ 's — which is manifestly impossible. On the other hand, the rotation cannot take place along any other of the  $\frac{U}{D}$  simple spirals, for  $P$ 's modifications always arrive in the line  $hk$ . If  $st$  was not the direct opposite of  $hk$ , the rotation might conceivably take place in part along simple spirals, because there might then be intervals during which none of  $Q$ 's original or deflected modifications were present in the line  $hk$  or in other simple lines then being visited by  $P$ 's deflected modifications. But,  $P$  and  $Q$  being opposite, their reciprocally caused deflexions must always preserve the opposition between them; and the line of the resultant rotation must swerve continuously from successive simple spirals and, after a sufficient number of such swervings, return upon itself. And, if the group is not to be disrupted, each swerving from the lateral direction  $st$  must be in the direction of the average row of the group.

If  $P$  is repelling our group while  $Q$  is attracting it, the repellent and attractive influences will coincide along the line  $st$ , and the rotation will in consequence

be more rapid; but it will still be a resultant rotation in a continuously bent spiral line, for  $P$  could not repel the group without at the same time attracting it.

In any such resultant rotation the particular simple spirals swerved from would of course depend upon the character of the simple lines, as  $hk$  and  $st$ , involved.

We have now to find the simple spiral line with reference to which the consequences to any spiral motions in the cosmon of this rotation resulting from the conflict between the  $P$  and  $Q$  influences may be apprehended. It is obvious that this line can be neither  $hk$  nor  $st$ . The absolute velocity of the  $P$  rotation must of course be regarded from the point of view of the line  $st$ ; that of the  $Q$  rotation, from the point of view of  $hk$ . But neither of these absolute velocities possesses any implications in spiral motions; for, no matter how high or how low it may be, it must either exert no gravitational or vibratory influence whatever, or else it must represent an influence greater or less than is actually being exerted. Hence our resultant rotation must take place around a simple spiral line equally different from  $hk$  and  $st$ . In the diagram the line  $yz$  has been drawn to represent this line or axis upon which the resultant rotation takes place. The character of  $yz$  will presently be further enquired into. Meanwhile we should ascertain what consequences

are inevitable to the members, *a* and *d*, of such a resultant rotation taking place within their group.

We have assumed our group to have had no earlier experience of outside influences — never to have had a rotary position anterior to those established by *P* and *Q*. Let us suppose that, at the outset of the resultant rotation under consideration, the earliest modifications of *a*'s primary rotation by the resultant influence bring *a* into a rotary position in respect of *P* — or of any other body similarly placed — midway between those two positions, later to be occupied, in either of which any influences proceeding from *P* — or from the similarly placed body — are as different as possible from those reaching *a* while in the other position. This difference, let us say, will be one of strength in any migratory or vibratory inducement from *P* or other similarly placed bodies. We know that such differences must be created by the resultant rotation, and we shall presently try to discover wherein their importance lies.

If *a*'s primary rotation had reached that stage in which the earliest modifications brought *a* into this mean position in respect of *P*, *d* must at the same moment be brought into an extreme position in respect of *P*, because its primary rotation is at any time at an opposite stage to that of *a*. (By extremes will of course be understood the greatest differences compatible with the size and mass of the group.)

$d$  will then occupy the mean position in respect of  $Q$ , the opposite of  $P$ .

Hence it is clear that, at the end of half a resultant rotation,  $a$  will occupy a rotary position in respect of  $P$  as different as possible from its former position; *i.e.* it will occupy the extreme position abandoned by  $d$  at the outset of the rotation. It cannot, then, occupy a position in respect of  $Q$  as different as possible from its original position which was one of the extremes; nor can it have passed through this position on the way, for it was then always nearer to its original position. Since  $Q$  is the opposite of  $P$ , it seems that  $a$  must make another half rotation before reaching the position most different, in respect of  $Q$ , from its original position.

This position sought by  $a$  must meanwhile have been reached by  $d$ , for  $a$  is about to follow in  $d$ 's tracks. It must therefore be  $d$ 's greatest divergence from its own former position in respect of  $Q$ . Hence it cannot be  $d$ 's greatest divergence from its former position in respect of  $P$ ; another half rotation will bring  $d$  to this position.  $d$ 's first half rotation must, however, bring it into the same position in respect of  $P$  that was originally occupied by  $a$ .

At the end of one complete secondary rotation of both  $a$  and  $d$ ,  $a$  will be as far as possible from its original position in respect of  $Q$ , but will have returned to its original mean position in respect of  $P$ .

$d$ 's positions will be similar, only with  $P$  and  $Q$  interchanged.

At the end of one and a half rotations of both  $a$  and  $d$ ,  $a$  will again be as far as possible from its original position in respect of  $P$ ; *i.e.* it will have reached the extreme in respect of  $P$  opposite to that extreme occupied at the end of the first half rotation. In respect of  $Q$  it will be again in the mean position and nearer by half to its original extreme position than it was one half rotation back.

$d$ 's positions will be the same as  $a$ 's, only with  $P$  and  $Q$  interchanged.

At the end of two complete rotations both  $a$  and  $d$  will have returned to their original positions in respect of both  $P$  and  $Q$ .

It is seen that in the space of these two complete rotations  $a$  and  $d$  have each occupied a mean and two different extreme positions in respect of both  $P$  and  $Q$ , — ( $a$ 's mean in respect of  $P$  and  $d$ 's in respect of  $Q$  being at the beginning and end of the rotations, and the extremes being reached at the middle points of the rotations), — and that if, for any reason, the group is at any time disrupted, the positions determining either  $a$ 's or  $d$ 's response to any gravitational or vibratory inducement whatsoever will be, not their positions in cosmic rows, but these new rotary positions established by the influence of  $P$  and  $Q$ .

If  $Q$ 's influence had been stronger than  $P$ 's, the rotation would have been the same in character, but its order would have been reversed; *i.e.* at the end



of the first half rotation, *d* would have occupied *a*'s original positions, and *a* would have occupied the extreme in respect of *P* opposite to that occupied by it during the reverse rotation.

From our review of these rotations we derive the following general statements:

In the rotation of any stable group in response to influences of unequal strengths and opposite directions, each member will occupy at the end of 1, 3, 5, etc., complete secondary rotations the same rotary position that was occupied by the corresponding member in the opposite half of the group one half rotation earlier; and at the end of 2, 4, 6, etc., rotations, it will occupy its original position. At the end of  $\frac{1}{2}$ ,  $2\frac{1}{2}$ ,  $4\frac{1}{2}$ , etc., rotations, and at the end of  $1\frac{1}{2}$ ,  $3\frac{1}{2}$ ,  $5\frac{1}{2}$ , etc., rotations it will occupy positions again opposite to one another, and as different as possible from the two other named sets of positions. It will never occupy a position nearer to or farther from the average row than its original position, and it will always bear the same relation to the axis of rotation.

Hence it would seem that if we might regard a stable group as a disruptible body, not constrained by its internal organisation to respond as a unit to all attractive and vibratory inducements, any consequences of a rotation, such as described, to individual members of the group might be greater in proportion to the squares of the doubles of their

distances in cosmic lines from the average row. We shall presently see that this statement must be modified.

The axis  $yz$ , a simple spiral line equally different from  $hk$  and  $st$ , was found to be necessary for the apprehension of this rotation which resulted from the excess in velocity of one of two contemporaneous and opposite rotations over the other. But this axis may itself be the line of rotation of a third attracting body, as  $R$ , capable of setting up a new rotation in the group. And if the influences of  $R$  and of another body having a rotary position as different from  $R$ 's as possible (in respect of our group) are of unequal strength, a resultant rotation will take place in the group upon an axis different from  $yz$ . Now, if  $yz$  is equally different from  $hk$  and  $st$ ,  $R$ 's rotary position is of course equally different from  $P$ 's and  $Q$ 's. If the rotary position of  $R$ 's opposite is likewise equally different, or in any way different, from  $P$ 's and  $Q$ 's, the implication of the axis of the new excess rotation and of the axes of a third, a fourth, a fifth, etc., such rotations necessarily to be derived from the existence of the axis  $yz$ , will be that every simple spiral line is as different as possible from every other such line, and hence that no cosmic line may be distinguished from another; which is contrary to our symbolical assumption. According to this assumption  $P$ ,  $Q$ , and  $R$  must therefore be equally opposite to one another in their positions in respect of our

group and to no fourth body; any rotation occasioned by the inequality of  $P$  and  $R$  will take place upon the axis  $st$ ; and any rotation occasioned by the inequality of  $Q$  and  $R$  will take place upon the axis  $hk$ .

The group will contain  $\frac{U}{3D}$  sets of similarly opposite axes; and during rotation upon any one or more of these axes the relation of all fixed bodies outside of the group to the average row within the group will remain the same.

If the group is rotating upon the axis  $yz$ ; and if, at the moment when  $d$  is in the mean position in respect of  $Q$  and in an extreme position in respect of both  $P$  and  $R$  — when, consequently,  $a$  is in the mean position in respect of  $P$  and in an extreme in respect of both  $Q$  and  $R$  —  $Q$ 's influence is withdrawn and its consequences destroyed while unequal inducements from  $P$  and  $R$  set the group rotating upon the axis  $st$ , the character of this rotation must be the same as that of the rotation upon the axis  $yz$ , — yet it is obvious that the changes of position of every member of the group will be different in their sum and in any portion thereof.

Since  $Q$  is equally opposite from  $P$  and  $R$ , and since no inducement is being received from it, there can be no change in respect of  $Q$  along secondary rotary or spiral lines.  $d$  must in this respect maintain its mean position,  $a$  an extreme position, and

other members the appropriate intermediate positions, even as in the rotation upon the axis  $yz$ , when every member bore a constant relation to this axis and to  $R$ . Each member must always be in the same position for responding to any subsequent attractive or vibratory inducement from  $Q$ , although it may be in successively different positions for modifying  $Q$ 's inducements for the benefit of other bodies. In this rotation upon  $st$ ,  $a$  will, at the end of one half rotation, reach an extreme position in respect of  $P$  and the mean in respect of  $R$ ; a whole rotation will find it in the mean in respect of  $P$  and in the opposite extreme in respect of  $R$ ; midway on the second rotation it will reach the opposite extreme in respect of  $P$  and the mean in respect of  $R$ ; after two complete rotations it is home again. At every stage of the rotation it will be in the same extreme position in respect of  $Q$ .

But  $d$ 's rotation in response to the resultant inducement can make no difference in its position in respect of any one or all inducements now being offered in spiral lines. It occupies at the outset an extreme position in respect of both  $P$  and  $R$ ; and since  $P$  and  $R$  are opposites, any motion towards the mean in respect of the one must imply a change, in respect of the other, either in the direction of the mean or toward a new extreme greater than is compatible with the size of the group; therefore  $d$  can make no change of position. If the mass of the

group is sufficiently great, there will be other members besides  $d$  occupying mean positions in respect of  $Q$ ; in such members any rotation due to the inequality of  $P$  and  $R$  will persistently destroy its own consequences, and these members will undergo no change possessing implications in any spiral motions.

If, at the moment when  $d$  is in the mean position in respect of  $P$  and in an extreme in respect of both  $Q$  and  $R$  — when, consequently,  $a$  is in the mean position in respect of  $Q$  and in an extreme in respect of both  $P$  and  $R$ , — rotation begins upon the axis  $st$ ;  $d$  will experience the maximum influence of the rotation, whilst  $a$  and any other members occupying, at the outset of the rotation, mean positions in respect of  $Q$  will undergo no change of position.

Any rotation set up in the group by  $Q$  and  $R$  upon the axis  $hk$  will entail similar consequences to  $a$  and  $d$  according to their positions at the moment when the rotation is begun.

If, as we have assumed to be the case,  $a$  or  $d$  or both experienced the maximum influence of rotations upon the axes  $yz$ ,  $st$ , and  $hk$ , they could neither of them experience this maximum influence of a rotation upon any other axis. The maximum influence must then be experienced, if at all, by members nearer to the average row.

It is readily to be seen that the number of secondary rotary positions occupied by any member of a group during any given resultant rotation must be

very much less than  $\frac{2U}{D}$ , — the number of primary rotary positions it occupies with regard to the average row. (Cf. page 190.) For example, during the rotation upon *st*, as reviewed above, *a* might not occupy any of those positions occupied by *d* and similarly placed members, although it might occupy such positions during rotations upon other axes. And the same thing would be true of those similar rotations, or revolutions, described on pages 209 et seq. The various kinds of bent spiral lines of rotation and revolution will not be reviewed in detail, although the character of a certain one amongst such lines will appear in the course of a consideration presently to be undertaken.

During simultaneous rotations upon more than one axis no member of the group could fail to undergo changes of position; on the other hand, no member would ever occupy the extremes of position otherwise possible within the group. The intervals at which members would return to their original positions would depend upon the relations between the axes and between the velocities of rotation.

It is now clear that only in respect of cosmic rows are *a* and *d* the two outermost members of our group. In respect of any motions in spiral lines there may be an indefinite number (up to  $\frac{2U}{D}$ ) of outermost members equidistant from the centre; and the

number of such outermost members as well as the number of inner members must depend upon the mass — *i.e.* the arrangement — of the group. And though, in respect of cosmic rows, *a* and *d* are the polar members of all axes, each may be a polar member of but one apparent axis, — *i.e.* of an axis that may possess any significance in spiral motions. If we would find the outermost members of a group in respect of cosmic rows, we must know the history of all the influences to which this group has ever been subjected.

If, of any two conflicting influences to which a group is being subjected, the one is intermittent whilst the other is persistent, or if the stronger influence is alternately a pull and a push, it may be that complete rotation will never occur, but that a rotary vibration will be set up in the group. Such vibrations will not be considered in this enquiry, although the importance of their influence upon another class of rotary vibrations later to be mentioned will be obvious.

If, of two influences to which a group has been subjected, either or both are withdrawn, the rotation set up by them will, if not checked by some third influence or combination of influences, be prolonged, even as will a vibration, for a period whose length will be as the mass of the group and as the original velocity of rotation.

A league of groups or of associations of groups

must contain more than one average row, and each centre-change contained within it must have different sets of primary rotation: one in respect of its group; another in respect of any association in which its group may be participating; a third in respect of the league as a whole. At any given moment the stages reached in each of these rotations will of course be opposite in opposite halves of the group, association, or league. Remembering the necessarily vast superiority in lateral distances within any centre-change over the length in cosmic lines of any league of groups that might have the slightest cohesion, we must recognise that any group within such a league might have a very great number of different primary rotations and still be able to rotate secondarily upon an axis. And of all the various rotations conceivable within any league of groups those possessing the most important consequences to all its component groups and their individual members will be rotations of the league as a whole; for in these rotations will the groups and their members make their widest divergences from any given positions. It is to be remembered that no league could long survive in which the secondary rotary velocities were not equalised by compensation, but that no need would exist of — rather would a distinct disadvantage lie in — an equalisation of vibratory velocities. All vibrations must, then, be the affair of the component groups and associations, as might likewise be



certain rotations; but the most important rotations of all would be the affair of the league as a whole.

A survey of the different kinds of leagues that might conceivably be formed at different times in the symbolical cosmon is neither within the scope of this enquiry nor within the powers of its conductor. But the obvious probability of formation, under certain circumstances, of a certain kind of body should be mentioned.

If at any time a very large number of groups existed in any portion of the cosmon, remaining for a considerable period subject to reciprocal pushes and pulls of a not very complexly conflicting nature, they would tend to gather together — no matter whether approaching one another in cosmic lines or simply in changing rotary positions — in a single league whose extent was less than that of the sum of the unattached groups. This process must obviously be accompanied by an increasing amplitude of vibration of the individual groups and probably by an increasing velocity of rotation of the league as a whole. The consequent menaces of disruption of the league even while it is in process of formation would doubtless result in giving to the league an organisation under which its outer groups would be separated by greater distances than its inner groups in proportion to the squares of their distances from the average row. (Cf. page 223.) This organisation embodies the maximum response to the mutual

attraction of groups compatible with the necessary concession to the disruptive tendency imposed by the increasing velocities of rotation or of vibration or of both: it implies, moreover, the least possible number of outermost members in proportion to the number of inner members. Such a body seems the most obvious league of stable groups to be formed in a cosmon in which the conflicting pushes and pulls were comparatively simple, — in which, *i.e.*, the experience of individual cosmoids was not yet so great as to prompt them, under certain circumstances, to behave in a highly irregular manner looking to remote benefits. Whether such a body would, without further incident, settle down into a stable form and gradually part with more and more of its rotary and vibratory velocity as its field gradually sought the simplest form, or whether it would at certain junctures be forced to part with whole sections of its mass, would depend upon many circumstances of its origin and situation which will not be considered in this enquiry. Here we need only recognise that such a body seems in all respects similar to the spherical bodies that people our apparent heavens. And its resultant rotation upon a single axis seems equivalent in all its stages to the similar rotation of a cooling body such as the Earth.

Leaving out of account all other motions of the Earth as well as the inclination of its axis, a description of its rotation in symbolical one-dimension

terms may readily be compassed with the aid of a tennis-ball.

Draw a line around the tennis-ball to represent the Earth's equator, and stick three pins in the ball, one each at the North Pole, the point in the equator of longitude  $0^\circ$ , and the point in the equator of longitude  $90^\circ$  E.

Figure 19 may be used collaterally to represent the Earth as a league of stable groups.

Let the heads of the three pins in the order named represent the rotary positions, in respect of the Earth, corresponding to three influences,  $R$ ,  $P$ , and  $Q$  respectively, which may conceivably set up rotations in the Earth. Let  $P$ 's pin-hole (longitude  $0^\circ$ ) be  $a$  (Fig. 19), and  $Q$ 's pin-hole (longitude  $90^\circ$  E.) be  $d$ .

Let the Earth be supposed to be rotating upon the axis  $yz$  in response to any resultant influence of  $P$ 's and  $Q$ 's in which  $P$ 's influence is the stronger and is attractive whilst  $Q$ 's is either attractive or repellent.  $Q$ 's influence may be left out of account in this example.

The Earth being at rest in cosmic rows,  $P$ 's influence is not exerted in the direction of the average row of the league, but is a lateral influence. Upon any given axis it must be one of but two opposite lateral influences, the attractive and the repellent. Since all portions of the Earth must, during the rotation upon  $yz$ , maintain constant positions in

respect of  $R$ ,  $P$ 's attractive and repellent influences may not be exerted north and south from  $a$ . Since  $P$  is the opposite of  $R$ , its influence must then be exerted east or west from  $a$ .

Let  $P$ 's attractive influence be represented by an imaginary arrow perpendicular to the pin and pointing east.

No matter what  $P$  may be nor whether its migrants are still reaching the Earth, let the Sun be supposed to occupy a like rotary position to that represented in  $P$ 's attractive influence. The Sun's rays reaching any portion of the Earth at any time will, then, be travelling in the direction indicated by the arrow representing the direction in which  $P$ 's attractive influence is being exerted.

Withdraw the  $P$  and  $Q$  pins, but keep them and the imaginary arrow in their original positions in respect of the ball. By means of the  $R$  pin set the ball rotating from west to east.

At the outset of the rotation the Sun will be setting at  $a$ , which is occupying the mean position in respect of  $P$ .  $a$  is on its way to that extreme position in respect of  $P$  where  $P$ 's attractive influence may reach it only after passing through as many centre-changes as are contained in an apparent diameter or axis of the league. More strictly speaking, its rotary position at that extreme must, by virtue of the league's organisation, be the precise equivalent of a member or group which had, one half rotation

back, been receiving  $P$ 's attractive influence thus indirectly. Its response to the attractive influence will be the same as before, provided the league does not suddenly break up, because the rotary velocities involved are always equalised throughout the league. But since vibratory velocities are left to differ among themselves throughout the league,  $a$ 's response to the Sun's rays will be the minimum in the league when it reaches the position occupied at the outset by  $d$ .

At the outset of the rotation it is, then, midnight at  $d$ .

At the end of one half rotation — *i.e.* one quarter rotation of the tennis-ball — it will be midnight at  $a$ , and the Sun will be rising at  $d$ .

At the end of a complete rotation — *i.e.* one half rotation of the ball —  $a$  will reach the mean in respect of  $P$ , and  $d$  will reach the opposite extreme. At  $a$  the Sun will be rising; at  $d$  it will be midday.

At this point an imaginary arrow representing  $P$ 's influence at  $a$  would still point east — *i.e.* in a direction apparently opposite to that in which it pointed at the outset of the rotation — because  $P$ 's influence, being constantly attractive, can at no time cause  $a$  to retrace its steps. But the moment before this point was reached,  $a$  could receive the influence of the Sun's rays only through a portion of the Earth lying to the eastward of  $a$ ; and  $a$  is now travelling towards the extreme in respect of  $P$  op-

posite to that which it was approaching during the first half rotation; hence the Sun's rays will at this point have an apparently opposite or westerly direction at  $a$ .

At the end of one and a half rotations it will be midday at  $a$ , and the Sun will be setting at  $d$ .

Two complete rotations (or one rotation of the tennis-ball) will find  $a$  and  $d$  in their original positions.

Another example:

Let the rotation be the same as before, but let the Sun occupy the rotary position represented in  $P$ 's repellent influence which, by assumption, is not being exerted upon the Earth. The direction in which the Sun's rays would travel must then be indicated by a second imaginary arrow also perpendicular to  $P$ 's pin, but pointing west instead of east. At the outset of the rotation the Sun would rise at  $a$ , and it would be midday at  $d$ ; and at the end of one half rotation — or one quarter rotation of the tennis-ball — it would be midday at  $a$  and the Sun would set at  $d$ .

Again, if rotation upon the axis  $yz$  cease while  $a$  is occupying the mean position in respect of  $P$  and its original extreme in respect of  $Q$ , and a new rotation begin upon the axis  $st$ , the opposite directions of  $P$ 's attractive and repellent influences are changed because all portions of the Earth must maintain constant positions in respect of  $Q$ . The

arrow indicating the direction of  $P$ 's influence must then point either north or south from  $a$ ; and  $R$ 's arrow will point in the opposite direction.

If rotation take place upon the axis  $hk$  beginning while  $a$  is in its original position; and if the Sun's rotary position coincide with that represented in  $P$ 's attractive influence (now removed), — at  $d$  it will be successively midnight, sunrise, midday, sunset, as before; but at  $a$  the Sun will always be on the horizon. If  $P$ 's influence now begins again to be felt, it must be both an easterly (or westerly) and northerly (or southerly) influence because the Earth is already subject to the influences of both  $Q$  and  $R$ . Hence the rotary position of the Sun, by assumption an independent body, could not have coincided with the position represented in the revival of  $P$ 's influence; it coincided with the position represented in  $P$ 's attractive influence when there was no rotation upon the axis  $hk$ . And the revival of  $P$ 's mixed influence will find any given group in the same position for responding to it, independently of the stage of the rotation upon  $hk$  reached at the moment of such revival.

It is obvious that resultant rotations — *i.e.* rotations possessing implications in any spiral motions — could not take place simultaneously upon more than two axes. Simultaneous rotations upon three axes would tend to bring different portions of the body towards the same means or extremes.

If they were opposite axes, one rotation would be lost; otherwise rotations would take place upon two resultant axes.

In simultaneous rotations upon two axes the axes would not pass through the same groups at different stages of the rotations, but would revolve one about the other.

Simultaneous rotations upon more than one axis and upon axes not opposite to one another will not be reviewed in these pages; the simple rotations reviewed above seem sufficient as illustrations of the principles underlying all kinds of rotations of leagues of stable groups.

The Earth, as we know, has other motions in addition to the rotation upon its axis. Certain of these motions will presently be considered from the one-dimensional point of view. Meanwhile we may complete our review of the elimination of vibratory waves.

In a cosmon certain portions of which were thickly inhabited by groups of different mass, associated and leagued together in various ways and exerting various influences upon one another at the same time, the process of transmission of vibratory waves must contain certain features that were not considered in our preliminary review of the subject. The implications of these additional features are necessarily so varied that a comprehensive survey of them would lie beyond the scope of this essay. A few of the



more obvious ones should, however, be mentioned. For this purpose we may again use Figure 16, supposing *a*, *b*, *c*, and *d* to be vibrating groups separated by distances in cosmic lines indefinitely great, though relatively such as are indicated in the diagram.

In the first place, *a*'s and *b*'s rotary positions will be supposed to have been established by *c* alone. If *b* and *c* have the same mass, *a* will under no circumstances respond to *c*'s wave, since (in their original positions at (1)) *a* is connected with *b* by 49 lines of supply to every 9 lines by which it is connected with *c*. But, if the ratio of *c*'s mass to *b*'s is greater than 49:9, and if the distances between the three groups are still as at (1), it would seem that *a* would respond solely to *c*, and that, if *b* moved indefinitely between the two, *a* would respond first to the one and then to the other, but never to both at the same time.

Such would be the case if vibrating groups of different mass produced waves of the same length. And the above description would indeed be suitable if *c*, instead of being a group of greater mass than *b*'s was an association or league of groups having all the same mass as *b*'s, for the waves from an association must pass through every centre-change in the association and must therefore have the same length if all groups in the association have the same mass.

But if *b* and *c* are of different mass, the coinci-

dence of waves must at any time be only partial, and *a* will at all times respond to some extent to both *b* and *c*. The ratio of the number of coinciding modifications to the number of separate pairs of modifications would depend upon the number of lines of supply involved; it would vary with the square of the distance.

That is to say, if *b* moves nearer to *a*, the increase in the number of lines of supply connecting *a* with *b* and the corresponding decrease in the number of lines connecting *c* with *b* will result in increased elimination in *a* of *c*'s modifications by coincidence with *b*'s in proportion to twice the square of the distance moved by *b*, although the number of lines connecting *a* with *c* will be the same as before.

If *a* moves towards *b*, the elimination will increase with the square of the distance moved, since the increase in lines connecting *a* with *b* will be greater than the increase in lines connecting *a* with *c* in proportion to the square of the distance moved by *a*.

If *b* moves towards *c*, the elimination will decrease in proportion to twice the square of the distance moved.

If *c* moves towards *b*, it will decrease in proportion to the square of the distance moved.

But distance is only one of the most obvious determinants of the elimination of vibratory waves by coincidence. In a cosmon in which the stable groups were similar in number, arrangement, and variety

of mass to the atoms of our actual apparent universe, the elimination by *b* of certain modifications from *c* might be either so great or so small that the influence of distance, though omnipresent and regular in its operation would within certain limits be insignificant in proportion to the whole amount of modifications involved. For elimination would depend at any time not only upon the mass of individual groups, the distances between them, and the number and character of the pushes and pulls to which they were at that time subjected, but also upon the character of their associations and the manner in which these associations were banded together, as well as upon certain other conditions which need not here be considered.

Thus, if *d* (Fig. 16) was a body governing *c*'s and *b*'s positions and was the source of vibratory waves of different length, *c* might conceivably eliminate but few of a certain set of waves of which *b* would eliminate nearly all that remained of this set, although another set of waves might find no response in *b* owing to *c*'s interference or because *b*'s mass was such that under any circumstances its responses to these waves would be mutually destructive. If *a* occupied a rotary position different from *b*'s and *c*'s, it would respond to all appropriate waves from *d*, and might cause in *b* a responsive vibration to certain of *d*'s waves which had been eliminated by *c*. It might similarly reflect *d*'s waves for the

benefit of a body which lay beyond the limits of the diagram and which might not respond directly to *d*'s waves because of the interference of either *c* or *b*.

Whatever the masses involved, elimination would of course be greater if the number of eliminating bodies was greater.

And of various sets of waves emanating from any given body, as *a*, and passing through another variously vibrating body, as *b*, the longer waves representing the slower vibration of lighter groups would be eliminated in greater degree than the shorter or longer waves representing the more rapid vibration of heavier groups, because in their passage through any variously vibrating centre-change their component modifications would be fewer and separated by relatively greater distances and would in consequence be more exposed to complete elimination by the denser and more numerous waves emanating from heavier groups.

Considering the very great conceivable differences in wave lengths it seems likely that their effects upon groups would be widely different; and that a body having many rapid vibratory rates might entirely eliminate longer waves representing a great amplitude of vibration without itself acquiring more than a comparatively slight amplitude of vibration in response to these longer waves.

From this general review of vibrations arising from the reciprocal menace of stable groups ap-

proaching one another in spiral lines (or in spiral changes of rotary position) it seems not improbable that the consequent modifications of lines of supply should give rise, like the ether waves of our experimental knowledge, to the various phenomena known as heat, light, chemism.

That another class of modifying waves must inevitably be present in the cosmon has already been suggested. Modifications similar in character to those considered above, though different in velocity, would undoubtedly have arisen if the members of the groups involved had in the first place been normally at rest with reference to one another instead of presenting successively their  $\frac{2U}{D}$  different aspects to the cosmic row of average distance. This primary rotation of members implies a second set of vibrations, rotary in character, from which the resultant modifications would be governed, as to velocity and numerical value at a distance, by the same laws that governed the linear modifications. In associated groups vibrating within one another's fields, the members would, then, have the following different rotary motions imposed one upon the other: (1) the motion pertaining to the group; (2) the motion pertaining to the association; (3) the motion imposed by attractive migrants travelling in long spiral lines; (4) the rhythmical vibration

in spiral lines or in spiral changes of rotary position ; (5) the rhythmical rotary vibration imposed by the proximity of the rotating members of other groups. It is obvious that these last-named vibrations must be as various in character as are the sum of existing groups and the conditions of their existence. That they must at times be the occasion of the formation or disruption of associations, of the mutual attraction or repulsion of groups, and of spirally linear vibrations in groups ; that they must at other times be themselves set up by the linear vibrations : all these statements seem naturally to be derived from our examination of the character of the stable groups. No review of the implications of these vibrations will be attempted in these pages. It is here sufficient to point out their probable similarity to those waves productive of the observed phenomena of electricity and magnetism.

But one more probability will be considered in connexion with the one-dimension universe. In any region of the cosmon in which stable groups existed in any considerable number, a considerable degree of closeness in their relations in the cosmon would doubtless be established in the interest of variety in these relations. If we recur to our considerations in connexion with Figure 16 (page 163 et seq.), we must surmise that if, from a portion of this thickly settled region of the cosmon, a considerable number

of groups were forcibly abstracted, a tension would at once be created in other portions of the same region. And when the abstracting force was removed, the depopulated district would straightway become inhabited again, very much as before. One-dimensional nature would probably abhor a vacuum.

It would seem that we had now sufficient material in the form of statements bearing different degrees of probability to warrant a guess as to the significance of our one-dimension universe and the symbols we have used in treating of it. My guess is twofold, as follows:

(1) If the one-dimension universe should produce human beings living, thinking, seeing, feeling, in the partial, evolutionary way that is ours, the stable groups and their implications above considered would, at some period in the existence of such a human race, be appropriate and useful symbols of that ultimate process which was not then discussable as such. In other words, the cosmon which dies in giving birth to a new cosmon that is different from the old by virtue of this death and birth, would sooner or later produce a cosmon which was partially apprehensible to contemporaneous beings like ourselves in its suggestive apparent forms of free rovers, centre-changes, stable groups, etc.

(2) For more immediate and practical purposes,

the stable group would be described by these same human beings as an atom of matter; and the other symbols of the one-dimension universe which have been used in the above investigation would be described in the manners already indicated in the course of this investigation.

The grounds of this twofold guess have, for the most part, been reviewed only in their general aspect, yet in a manner perhaps as thorough as was compatible with the necessarily unscientific point of view of the reviewer. Such small amount of detailed investigation as has been recorded in this chapter was undertaken largely in deference to the point of view of others. To the writer any mechanical account of, say, gravitation possesses far less interest and far less semblance of stability than those considerations, vague, incapable of any but the clumsiest expression in words, and correspondingly more convincing, which bear upon the relation between  $KT$  and  $K1$ . Before enquiring, however, into the possible effect of these considerations upon our thought of the more immediate future, we should extend our examination of probabilities in respect of two significant problems of the symbolical one-dimension universe. First let us consider

The implications of motions of stable groups or leagues of them through the cosmon in spiral lines, whether simple or bent.

We are at no time to be betrayed into thinking



that our discussion of Figures 15-18 (page 163 et seq.) has been productive of any hard-and-fast conception of the symbolical cosmon. Indeed, if anybody were to take these diagrams and give me a satisfactory account of the spatial necessity implied in them, he would thereby convince me that the symbols they illustrated had lost whatever usefulness they might have possessed in interpreting ultimate cosmical change. Any symbols of reality invented by us on the hither side of *KT* are necessarily incomplete, faulty; and the obvious margin of error, provided it be not too wide — provided it be narrower than that belonging to earlier symbols — is the index of their usefulness. Hence a symbolical necessity may, under no circumstances, be completely accounted for. If our symbolical cosmon is a symbol suited to our position in time (*i.e.* to our experience), any subsequent modifications of it productive of a sufficient narrowing of its obvious margin of error would mean that the modifying agent was no longer living in that material, geometrical universe whose phenomena had suggested this symbol.

Now, any person living upon Earth to-day who wishes to use this symbol will doubtless recognise that a centre-change must, from its own point of view, be the limit or centre of the cosmon; and that, from the point of view of the whole cosmon, each centre-change must occupy as many different

positions as there are other centre-changes in the cosmon. While using the symbol in question, he can in no way escape from this necessity of which he may, likely enough, give a better account than is contained in these pages although he may never, beyond a certain point, add to its definiteness while he continues to live a material, geometrical life. In approaching the problem under consideration, this necessity must be kept always before us.

Likewise to be kept before us is the necessity, often referred to, that the lateral distances in any centre-change — *i.e.* the number of different modifications of changes possible within it — must be vastly greater than the length in cosmic lines of any possible league of stable groups (*i.e.* the number of changes of position of a migrant travelling from one end of the league to the other).

Finally a third necessity, often referred to and now to be kept before us, is that any stable group or league of them keeping to the same position in cosmic rows and undergoing the appropriate rotary changes — the successive rotations of each centre-change following a spiral line that involves successively the least possible differences in all adjacencies — must respond spirally to all migratory and vibratory inducements in precisely the same manner as if it were travelling in a spiral line through successive cosmic rows.

From these three necessities we must draw one

of two conclusions respecting spiral motions in the symbolical cosmon.

(1) Considerable changes of position in cosmic rows may take place only at a comparatively early stage of the cosmic life when centre-changes are comparatively few in number. With increasingly frequent formation of centre-changes, and with their banding together in stable groups and leagues of groups numerically comparable in any given portion of the cosmon to those contained within the bodies that people our apparent heavens, such changes of position could rarely, if ever, occur.

(2) The growing restrictions upon the process of free-roving are uniform in all portions of the cosmon; and, at a certain stage of the cosmic life, the maximum number of centre-changes are formed simultaneously, the number of cosmic rows separating any two centre-changes equalling the number of other existent centre-changes. Successive disruptions of centre-changes — owing to inefficiency of the earlier systems of supply — leading to the eventual establishment of the system *B*, Figure 14, will then always take place in the same cosmic rows. Henceforth the effects of the reciprocal influences of centre-changes are always purely an affair of internal rotary modifications, since they could never move from the cosmic rows in which they were formed. And the first differences in the mass of stable groups will arise from the concerted action of two or more groups of like mass.

The degree of probability of (2) is so vastly and obviously superior to that of (1) as to require no detailed discussion.

According to (2) it is readily to be seen that, in respect of all spiral motions, any number of centre-changes up to  $\frac{2U}{D}$  might be equidistant from any given centre-change, as  $a$ ; and any one of these centre-changes might, in this respect, move alternately towards  $a$  and away from it without endangering its own existence or that of any of the other centre-changes.

If the Sun, Earth, and Moon be leagues of stable groups, only a complete history of their antecedents would enable us to determine the positions in cosmic rows of their component centre-changes.

If the Earth were detached from the Sun when the rotary and vibratory velocities of their component stable groups had risen beyond the point at which so many groups might share a single average row, the Earth, without changing its position in cosmic rows, would doubtless eventually settle down into two distinct rotations: the one — upon its own axis, and with reference to which the new average row remained fixed — derived from the original rotation of the joint league upon its axis; the other — upon an axis shared by the separate bodies — established by the conflict between the mutually repellent and attractive influences of the two bodies.

If the Moon were, for a similar reason, detached from the Earth, it could not rotate upon an axis of its own unless it departed so far from its former rotary position as to escape the controlling influence of the Earth, because no league of stable groups could rotate upon more than two axes at the same time.

None of the above-mentioned rotations could be simple rotations upon fixed axes such as those described on pages 218-238. For example, the rotation of the Moon that was established by the conflict between the mutually repellent and attractive influences of itself and the Earth must be modified by the influence of its former rotation upon the Earth's axis. And all rotations of Sun, Moon, and Earth must be modified by the influences of all other bodies lying within their fields. Hence the apparent polar members of all their axes are constantly changing.

If we thought we had learned how to navigate space and had fitted out an expedition to the Moon, and if this expedition was set rotating in the appropriate bent spiral and could be kept to this spiral for a sufficient number of rotations, it would find the Moon where it had expected to find it. If it continued in the same spiral, it must either pierce the Moon and emerge on the other side of it or else must push the Moon farther away from the Earth. If, however, it had been set rotating in a different

spiral, it might have left the Moon behind without having ever come into spiral contact with it. And in either case, our expedition would get no farther from the Earth, as migrants travel.

A word as to our ideas of magnitude is perhaps appropriate in this connexion.

In any experiments that we might make for the purpose of learning something of the organisation of a stable group, we must of course make use of our senses of sight and touch supplemented by instruments constructed along straight and bent lines. At the nearest point to a rotating centre-change that we could ever hope to reach by such means, we should be distant from it many times

$\frac{2U}{D}$  cosmoids or successive changes of position. It

must, then, seem to us to be very small, and a great number of such centre-changes would be required to make an object of considerable apparent size. The Earth must unquestionably occupy an enormously greater space in the cosmon than the modified rotary characters of its component stable groups would lead us to assign to it, supposing we could appreciate its extent in cosmic rows. Yet if we could perceive any one of its centre-changes from a distance sufficiently small, we should find that any cosmoid might travel much farther within this centre-change than if it emerged in a cosmic line and travelled the whole length of the Earth and back.

If the stable group and the atom of matter are equivalent symbols of ultimate change, some speculation is possible, in connexion with our conclusion (2), as to the destiny of matter. No such speculation will here be undertaken. As a starting-point, however, a certain consideration obviously suggests itself. In the second chapter (page 80) it was stated that matter could not conceivably absorb all that which was not matter. But it must be observed that, if matter gives place to something which is neither matter nor ether (*i.e.* neither stable group nor free-roving cosmon), the geometrical necessity considered in connexion with Figures 15-18 need no longer exist.

The second problem here to be noticed briefly is one that has of necessity been repeatedly touched upon and must be recurred to in the chapters to follow. This is

The relation between the symbolical cosmon and that problematical portion or phase of it whose experience might at some period be so wide that it described itself as taking account more or less accurately of changes bearing apparently a remote relation to it in every respect.

That the symbolical cosmic progression from that assumptive *K* 1 with which we began our consideration must have been continuously in the direction of increased heterogeneity because of the growing sum of real experience has been clearly indicated.

That among the immensely various motions and alliances, associative and otherwise, of the stable groups, certain regular processes of metabolism should be evolved; and that, among such processes, the survival of those which possessed the faculty of reproduction of their like under conditions more or less different should be favoured by the exigencies of a growing cosmic experience; that all the different varieties of these processes should eventually disappear in favour of others whose average of activity, at least, was more complex and more extended, — all these developments are not only intelligible, but are essentially of a piece with those earlier developments which we have reviewed in some detail. We have seen that, in the case of the individual cosmoids, the ultimate relief from congestion and the consequent postponement of a dead-lock in the cosmic processes has always come in the form of an apparent menace to an existing institution. It has always been a compelling or even, as it were, a destroying influence from which gain has been derived. The cosmoids apprehending only their immediate neighbours must continually be compelled into uncongenial surroundings that ultimate release from a greater danger may be secured. Any account taken of their immediate surroundings must in time include an account of remote regions of the cosmon, in which account the fulness of detail would vary directly with the distance in time from



*K1* and inversely with the distance in cosmic lines. That the cosmoids must be so compelled and that such account must be taken solely by virtue of that attribute — the ability to profit by their restricted experience since *K1* — which is symbolical of their essential property of motion, we have seen to be a positive necessity of the case, to the exclusion of any external governing or informing influence. That in time certain of the resultant processes should take a shape which described itself as consciousness or mind, and was appropriately mystified by the insufficiency of the description seems at least as probable as that *KT* should have been reached when molecular life or plant life was the most advanced form of cosmic activity. Equally rational seems the conjecture that the “mind” which eventually contemplates its own imminent translation from *KT* to *K1* will not be so perplexed by the consciousness of its immense superiority over our minds of to-day as we now are in contemplating the gap which separates us from the plants.

And the question, Whence all this great world? could have no meaning to this best of knowers save as one of the difficulties necessarily confronting an ancestry that grappled with ideas of finitude and infinity. Of any supposable universe other than the one-dimension universe no account could be in any way useful which offered no explanation of the origin of the “materials” of which it was made.

The only answer to "Whence?" is then "Unknowable"; and any who take this answer seriously must cease to think at all, since it possesses no implications beyond a denial of their right to even partial judgement in any particular of their existence. In a universe which may demonstrate the sum of possible differences and outside of which or anterior to which nothing is therefore conceivable, the question "Whence?" is of course meaningless.

To sum up, now, the results of this investigation in their relation to those other investigations recorded in the first two chapters:

It is not contended that a complete universe may be constructed out of logic. It is contended, however, that a complete universe may not be constructed in any other way. In other words, the construction of a complete universe is not in question at all: cannot possibly be a legitimate human aim. Here, indeed, is one expression of the principle of continuous change: Change is not yet defined; hence you cannot know what the universe is nor anything in it.

But observe what is indeed possible, according to the same necessity. You may go on improving your conceptions of phenomena up to any point within those limits to human or present-day experience which will appear obvious to omniscience. You may go on indefinitely separating illusion from

illusion; *i.e.* putting successive conceptions behind you. You may not discover what honey dew is, but you may satisfy yourself that it is not a "kind of saliva emanating from the stars." How do you do this?

Leaving poetic intuition out of account as a faculty rather difficult to discuss, you know two ways of doing this. One is by an exhaustive study of appearances; the other is by an equally painstaking application of logical methods to the first principle to which all appearances point. The former plan is at present distinctly the more popular of the two, and its results, so far as they go, have been thrilling indeed. But, since one of these results has been to emphasise more strongly than ever before the necessity that Change is the basis of all phenomena, Change must itself become a subject of discussion. Change is difficult to talk about; it is constantly denying the competence of logic to sound all its manifestations; yet it has this obvious advantage. If you begin with particular phenomena, you are dealing exclusively with that which can have no ultimate validity; but if you begin with Change, you stand on the firm basis of an immutable principle. (Cf. page 18.)

That Change, single, continuous, homogeneous, culminates, for one thing, in this apparent universe of ours is a conclusion inevitably derived from any painstaking study of matter, politics, love, elec-

tricity. *How* it may so culminate is the question that has been discussed in some of its more obvious aspects in the course of this chapter. It is a pretty exercise, and nothing in the world could be better worth while. Of all the thousands of young men, now potential scientists and philosophers, I should like to see at least one-half enabled to devote from a year to a lifetime of thought to enquiries of this nature. For not only are such enquiries essential to the continued advancement of knowledge, but they carry the promise of a rich reward, even within our day, to the curious investigator and the practical philanthropist alike.

Certain obvious inconsistencies in the terminology of this chapter were desirable in the interest of brevity. For example, "real cosmoids" means cosmoids as they would be regarded by any intelligence that did not stipulate for an illusory permanent "thing" as a subject for discussion. Similarly, "symbols of reality" means the assumed permanent symbols of an ultimate process. "Indefinite" is used with reference to the unknown possibilities of any particular epoch. That reality is the limit of the possible is, of course, implied in the results of this investigation.

## CHAPTER IV

### REASON AND WILL

IN this chapter and in those to follow, the results reached in the course of the foregoing chapters will be taken for granted and will be frequently referred to, although it will sometimes be desirable to cover a portion of the old ground a second time.

It is perfectly possible to speak of consciousness, its origin and destiny, in the same spirit and intent as of a particular idea or of an apple. For the conscious self is clearly one of the possible and inevitable illusions of which everybody takes account and about which everybody disagrees with his neighbour's positive statements except in so far as they describe it as an embodiment of Change. It is entirely natural that we should unite on the term *Consciousness* in the face of this disagreement, because we find it necessary to classify our illusions in the most obvious manner possible. Thus, a man who believes the stones to possess consciousness will generally use the term in the same way as a man who holds the contrary belief, because he readily admits that it seems to apply more certainly to

living animals than to stones or even to trees; just as a man who admits his complete ignorance of apples and pears will nevertheless speak fluently of both fruits and make the usual distinctions between them.

But, the universe itself being a continuous and homogeneous process, it is impossible to treat consciousness as a fundamental entity having beginning or end or actual residence in living beings. This is indeed old ground revisited; nevertheless an analogy and a further explanation may be of interest.

In our consideration of the hypothetical universe of one dimension we saw that the stable group was the source of waves travelling through the cosmon at a vastly different velocity from that of any modifications that might emanate from any of its members after the disruption of the group. But, since the velocity of the waves emanating from the stable group was determined by the constant ratio between mass and primary rotary velocity which, in turn, was derived solely from the symbolical ability of the cosmoids to profit by experience, it is clear that the formation of the stable group inaugurated no really new process in the universe. The cosmoids were changing places as before, but to us who were unable to comprehend all their individual changes it was convenient to invent the idea of a vibrating stable group, the source of

waves travelling at a uniform velocity vastly lower than that of migrants. Similarly, when the experimental atom of matter is disrupted or transformed with a loss of weight, it is inconceivable that the sum of any fundamental process is in consequence either greater or less: in deference to our ignorance of such processes, we find it convenient to say that purely material processes have suffered a loss. It is, then, out of the question that anything essentially new should arise when earth, water, and air give of themselves to the seed to produce a plant; or that any new process should have been evolved at that time in the past when plant life first made its appearance.

Of equal necessity, and still more obviously, is consciousness itself a symbol dependent at any time, for the particular quality of its appearance, upon the particular experience embodied in that ultimate change which it invariably shares with the objects affecting it. By "the particular experience" is meant of course the particular degree of experience, since qualitative differences in illusions represent quantitative differences in ultimate experience, or differences of position in the order of change. Very significant were those historically celebrated doubts as to the possibility of anything having had a beginning, which were suggested by the fact of our inability to fix in imagination the point at which such beginning should have taken place. At all

events, it should now be sufficiently clear that, if we could know enough about consciousness, we should never speak of its origin in either space or time. For it is only in deference to our ignorance of the subject that we speak of the child as possessing a new and individual consciousness appearing somewhere between its conception and its fifth year, or that we speak of epochs in terrestrial history in which conscious beings did not exist. And the destiny of consciousness, whether implied in the death of an individual or in the annihilation of the human race, is equally devoid of any significance other than that of a convenient symbol.

A thing which can have neither origin nor destiny in fact, seems hardly worth discussing as a thing apart in any ulterior sense. The chief logical conceit on which rests the supposed ultimate identity of consciousness may, however, be recurred to since it has already been mentioned (Chap. II, page 69). The assertion has often been made that a thing cannot be aware of itself, and this is doubtless a perfectly logical statement. But all empirical evidence and all logic point, first and foremost, to Change as the one and ultimate principle of the known and knowing universe. And this principle, as we have already seen, ultimately invalidates all logic and all empirical evidence except in one respect — in respect of itself. Incidentally it denies the possibility of an interval of time in which a thing may be itself and not some-



thing else, and stipulates that such a "thing" may be aware of that which it is replacing just as well as of anything else. "Just as well," be it observed, and no better. And this "just as well" means utterly badly, except always in respect of Change itself. It means far worse than our memories appear to serve us. For in the universe of Change, the act of knowing is no less illusory than the known.

This preamble has been designed mainly to emphasise the ulterior unimportance of any distinctions between Reason and Will. To whom, indeed, can it matter whether it be Reason or Will that impels a man to live when the odds are heavily against him? To whom can it matter if volition be explicable in terms of sensation or no?

It is highly doubtful if these questions will ever be mooted by any more advanced intelligences than our own. Amongst us of to-day they are clearly of great moment only to those who have for sole reliance a religion or a morality — who are obliged to defend this religion or morality at all costs since, if they were deprived of it, they believe they would be utterly at the mercy of death, suffering, their neighbours, themselves. To any who are not so dependent — and the practical purpose of this book is plainly enough to add to their number — the problems of the reason and the will must possess far less interest.

Nevertheless, these problems do at least possess an immediate practical importance. With regard to immediate posterity, it is desirable that some kind of negative understanding about them should be arrived at: just such an understanding as our most able and impassioned moralists and religionists are conscientiously doing their utmost to prevent. This is readily attainable by the curious and candid.

In a continuous universe it is, of course, just as impossible that volition should be ultimately explained in terms of sensation as that molecular life should be so explained in terms of atomic life. Nevertheless, so long as we continue to use the terms in question, the common-sense view — the view that would naturally be taken but for the above-mentioned considerations — is that probably volition is symbolically explicable in terms of sensation, because

(1) there is no evidence that volition is not thus symbolically explicable;

(2) of all the forms of mental activity, sensation is the most elementary and the most obviously present in the greatest number of relations between the organic and inorganic worlds; and

(3) the same acts often result from simple reflexes as from the most deliberate or harassed volition.

For similar reasons — and this is the more important point — the common-sense symbolical view of Reason and Will is that they are one and the same thing. The same consequences — say, life or death

— may follow in any particular case from the operation of either. Suppose a certain man to have taken his own life; we cannot say if Reason or Will was responsible. Suppose another man to be reasoning over his own life or death; we cannot possibly foretell the issue, even if we are as well acquainted with the circumstances of the case as he is himself.

Reason may quite well be regarded as included within Will — as being, if you like, an inferior though potent order of will which, for example, impels great masses of people to struggle to preserve life when, with the exercise of a better will, the hopelessness of any good coming of the struggle would become immediately obvious to them. Generally, however, we regard such a recognition of hopelessness as a mental process of putting two and two together. Hence it is easier to regard Will as a kind of Reason — a higher or a lower kind, as the case may be. There would then be a great many kinds or degrees of Reason; and it would doubtless be well for the practical philosopher to speak rather more cautiously of their relative values than has been usual in the past. No one of them, ultimately, can be higher or lower than another. Hence (and for other reasons that have been considered and will at once suggest themselves) it is perfectly unjustifiable for the practical philosopher to bring severely to bear upon them the results of his study of history. If he knew all the history there was to be known,

this would still be unjustifiable. Let us remember what there is that is certain. There is but one certainty, and to this certainty history has indeed contributed, but in very slight degree, as we commonly understand the term history. Other generalisations drawn from history are not only theoretically but also practically worthless except upon the assumption that most other people have drawn the same generalisations and are prepared to act accordingly. Once a more interesting basis for future action is provided, the particular lessons which constitute the so-called generalisations from history must go for naught. Of course, this may happen at any moment; and it will then be useless to rely on the probability that what will happen next year will be very similar to something that happened some four thousand years ago.

These remarks are made with especial reference to the so-called will to live, upon the general reasonableness or unreasonableness of which history can pronounce no verdict. In view of our one certainty, it must be contended that the will to live, even with the odds against happiness, is apparently a higher form of reason in the individual human being than the will to die under the same circumstances, because the individual human life possesses greater significance than the individual human death. Similarly, all other things being equal, there is better reason to rescue a shipwrecked crew than to leave them to drown.

These propositions suggest many others which will be discussed at some length in the seventh chapter. The purpose of the present chapter has been to show the futility (in the light of our earlier investigations) of any effort to unseat Reason or its equivalent as the prime motive force in our daily life. The effort was of course based on the assumption that all reason was good and might even be perfect and sound; hence it could not be reason that prompted a man to drag on a life of certain misery. Undoubtedly such reason is apparently bad; but it is just as much reason as that which impels another man to live morally, or as that which impels most men to set their own arbitrary limits to the jurisdiction of reason itself, — avowedly applying rational methods to all the immediate affairs of life, judging their neighbours by their ability for and persistence in applying such methods, yet raising each his own quaint little barrier beyond which reason shall not be suffered to tread.

The most highly rational life attainable by ourselves and by our immediate posterity will be sketched under some of its most important heads in the seventh chapter. First, however, because of their bearing on such a life, should be discussed somewhat more fully than hitherto the problem of dissolution, — dissolution of the material universe (Chap. V) and dissolution of the individual human life (Chap. VI).

## CHAPTER V

### DEVOLUTION

THE special student, as is well known, is prone to bring severely to bear upon general questions the results, both positive and negative, of his own particular branch of research. If I have devoted the better part of my life to music, I may look exclusively for melodies in a forest which is more remarkable for the variety in form and colour of the foliage. If I am a lover or a philanthropist, I shall very likely be scornful of impersonal or of any but the most immediately personal considerations.

Our concern being for the moment with the natural sciences, we may observe that the astronomer is often the most forward in wishing that the stars were either farther off or else very much nearer. And now a band of scientists of various denominations have been showing us excellent reasons to believe that we are in a fair way to be completely demolished within a very short time, — *i.e.* within a few millions of years.

It should be understood that this doctrine is entitled to the greatest respect by reason both of the considerations that support it and of the varied and

important achievements of its champions. For my part, I have no strong objection to subscribing to it provisionally; nor shall I resent being called silly or presumptuous for describing it, as I instinctively must, as a cart-before-the-horse kind of doctrine. Our notable friends and benefactors have loaded the cart with certain weighty packages on which they gaze in fascination and mild dismay. "Gravity uncomprehended," "Space uninhabitable," "Interstellar distances," are some of the labels upon this merchandise; presently, with a great heave of honest arms, in goes "Energy to be degraded," heaviest and bulkiest of all. When, at last, somebody thinks of leading poor Gee-Gee Humanity from his stall, these conscientious carmen turn to him with sad wistfulness in their eyes. His steps are so coltish; he is still so restive under the mildest of bits and harness! If only he might be allowed to grow and be properly broken — but alack! not a moment is to be lost in delivery of the goods. On the whole, it seems hardly worth while putting him in — and there's never a sign of another nag in the neighbourhood!

Yet, in truth, the future effect of earthly man upon the evolutionary and devolutionary process is a problem upon which no very satisfactory speculation is now possible. If we ask ourselves, May we, when our sun grows cold, give him a knock which shall rouse him again but not excessively to warmth?

no considerations suggest themselves which seem at all likely to throw much light on the subject. We know that the only thing needed would be a discreet but forcible knock. Who or what shall administer it is largely a matter of sentimental opinion: the straight thinker will be he that shall have guessed aright.

Or, in contemplating the radio-active matter of our solar system, we can hardly prophesy as to our chance of arresting or modifying that process of material decay which, though promising a longer period of comfortable warmth upon Earth, may eventually lead to conditions making impossible any such life as we have experienced as a race. It is true that to do this to some extent we have only to get into closer working touch with certain relatively superficial appearances or manifestations of change such as the internal organisation of an atom of matter. To some it may seem highly probable that this will be done in a comparatively short time; but a single step, short as it may appear when described in words, may be surprisingly long in the performance.

Any device that might be made to respond selectively to the various gravitational pulls to which it was subjected, regardless of their intensity, is likewise dependent for its invention upon the results of further research into the constitution of matter.

Finally, since we have received neither the visit



nor the message of any inhabitants of Earth's sister planets or of the planets of another sun, we may provisionally assume that these beings, if any such exist, are now or soon will be confronting this same problem of the cart and horse.

It becomes necessary, then, to contemplate as a possibility the eventual destruction of the human race; and, however this might be brought about, it is inevitable that we should now enquire what might happen afterwards, no matter how vague are the possible lines of enquiry. For this purpose we shall with advantage keep always before us certain familiar considerations which are generally absent, nevertheless, from an enquiry, say, into the destiny of politics. One of these considerations is our idea, experimentally gained, of relative magnitudes. We know not how big the universe may be, nor if bigness be a term really applicable to it. But in considering any evolutionary or devolutionary catastrophe, such idea of bigness as we have gained is necessarily to be taken into account. Now, relatively to the material processes of the sum of that part of the universe which we have measured, the most momentous events conceivable within our solar system would be so trivial that pin-pricks and flea-bites upon the human body are utterly inadequate as a comparison. We may be very important persons, we humans,—the more so, the better from an evolutionary point of view,—but the scope of our activity is

ridiculously small. In the far-off heavens are vast numbers of solar systems in which evolution is certainly going on under enormously various local conditions. In the regions beyond this stellar universe of ours — which universe may be but as an atom in the sum of things — there is no reason to believe that devolution has reached a stage at which it becomes a menace to a race of living beings such as ourselves. If the actual universe be something akin to our hypothetical one-dimension universe, it is clear that devolution is but a phase of evolution and has been going on ever since the beginning of evolutionary times. At all events, we are to remember that energy, being measurable, can be nothing but an appearance, and that its availability or unavailability can in no way affect the basic process from which it is derived.

Let two extra-terrestrial gamblers, knowing no more than we now know of those distant heavens, observe our extinction as a race and the return of Earth and her sister planets to the cold bosom of their mother sun. Only the offer of long odds would tempt either of them to wager that this sun and all its evolutionary records would never be inspected by an alien race.

Like gamblers, calculating the odds, must we approach all evolutionary problems immediate or remote. What shall we say, then, of the odds in this same problem, stated differently as follows?

That matter and energy should evolve is an evolutionary necessity as well as an almost inevitable inference from the facts of science.

That life should evolve is a similar necessity and fact.

Life is now entirely dependent upon matter and energy and inseparable from them. Whether or not they ever existed without ministering somewhere to life, whether or not life may survive them, — it is at all events certain that, within times of which we have some knowledge, there has been ceaseless action and reaction between life and its outside means of support.

Is it, then, likely that the degradation of matter and of energy which we observe to be regularly and continuously going forward will eventually render impossible all conceivable forms of life? Or is this process more probably coeval with modifications, palpable and potential, of life itself which will in time result in a life incapable of being supported upon turnips and potatoes, blankets and hot-water bottles, though able to flourish upon their degraded substitutes?

The more closely we examine, from the evolutionary point of view, this problem of the destiny of life in general, the more surely may we predict that, though there is not nor ever will be any evolutionary argument to convince, the probabilities of the case will, from age to age, lead our hereditary thought ever farther from the idea of extinction.

When we mount to the ultra-evolutionary lookout, we penetrate to a different atmosphere. We find, indeed, that much of the detail of our road of destiny has faded from view: sticks and stones, ruts and mire seem not to be there, nor the spring by the way-side; but we have no longer to judge by the few uncertain rods that lie under our very noses, since from here we may follow its true course from horizon back to horizon. The general character of this prospect has already been described: let us take another look.

From this seeming pin-point of an Earth goes forth each instant a complete potential copy of the immensely various things within it. All things outside receive the impression which then awaits but the developing hand of time. But what is this developing hand of time? We have seen it to be other impressions: new experience combined with old. Any point in time represents or equals the sum of experience; any later point in time again equals the sum of experience; the interval between these two points in time equals the difference in experience; the last moment of time equals all time, equals all experience; the first moment of time equals the least experience. We of to-day embody more time than did our ancestors. Our experience is therefore more rapid, although the evolutionary character of this experience may prevent us from becoming aware of this gain in speed. Similarly, the degraded matter of our planet

will embody more experience than the nebular matter from which it was presumably derived. Suppose the matter contained within our solar system to have formed part of an earlier system somewhere within which was developed a race of evolutionarily rational creatures like ourselves. Could we inspect these creatures and their activities, they might conceivably appear to us to have attained a higher degree of civilisation than would seem likely ever to be attained upon our Earth. Their evolutionary opportunities may have been greater or their racial life longer. Though unable or unwilling to avert their material doom, they may nevertheless have had good reason to believe that their local successors would be another hybrid race and inferior to themselves; that the two successive civilisations would be like the blossoming of a tree in two successive springs, the later blossoms being less full than the earlier, the tree itself destined to give place to others. But no considerations that may have brought them to this conclusion can have disposed them to melancholy, any more than we may ourselves be thoughtfully so disposed by the disappearance of a variety of fine birds.

## CHAPTER VI

### A RATIONAL VIEW OF DEATH

THEREFORE I confess I do not greatly care whether our race escapes the doom of its mother Earth or not. We have most of us been brought to the verge of individual suicide at one time or another, and undoubtedly the being brought to the verge is the painful thing. It is unlikely that anything worse is in store for posterity on this score. Indeed there is every reason to believe that earthly posterity will have ever fewer emotional concerns over the fate of the race as a whole and of its individual units, at the same time that it develops a greater intellectual interest in both questions; for an increasing indifference to death could not be supposed to make other than reasoned suicides more common, whilst the decline in force of the emotional instinct of self-preservation and in frequency of the opportunities of presuming upon this instinct in others would imply increased advantages of energy, time, and opportunity for investigating the more really interesting problems of life. To posterity death cannot be the same death that it is to us; if sufficient time is vouchsafed to this posterity upon Earth, death will

come to mean a new life the fulness of which, in its individual character, is — for pain or for pleasure — inversely as the fulness of the old. That our descendants will in reality be living faster than ourselves is theoretically clear; and it seems probable, so far as we can forecast the physical conditions of their life, that they will also be more active and alert in dealing with appearances. The advantage to us of to-day of speculating upon the considerations that would weigh with them in individual cases in favour of a tranquil suicide, or of a prolongation of their actual life, or in their choice of occupations is a point that will be taken up in the chapters to follow. Meanwhile, however, a few general conceptions may be stated.

We may conceive certain of our descendants as busily engaged in the construction of a machine for navigating space which interests them to some extent as a means of transporting the human race from their old abode, but more immediately as a mechanism and as the vehicle of a novel expedition of discovery.

Again, we may conceive the navigators of space as trying to discover, amongst other things, if the time be ripe and the means adequate for the definitive removal of themselves and their fellows from Earth, or if the time-honoured method of translation shall, in sum, be more suitable.

Again, we may conceive them as weighing

the rival advantages of different manners of race suicide.

Although gaiety is a frame of mind that seems hardly to be associated with the last and best of knowers, it is probable that our earthly descendants of the next few millions of years, provided they have nothing but themselves to fear, will take an increasingly brighter view of life at the expense of the more intense transitions from sorrow to joy. When the theoretical absurdity of the scruples of conscience and of the fear of death has had time to become one of the omnipresent determinants of intellectual characteristics handed down from father to son, the race will indeed be deprived of some of the fierce joy that follows the release from terror as well as of the generous glow of altruism, but will, on the other hand, be more equably gladdened by the perception of its gradual emancipation from the tyranny of lugubrious prepossessions. It should, however, be frankly admitted that the implied brightness of temper, though inevitably to be predicated of our eventual universal successors, might, in the case of our terrestrial descendants, be seriously interfered with by influences which we have now no means of measuring. For example, devolution may conceivably contain some cosmical catastrophe which would affect a root-eating humanity most grievously. But if, for a considerable space, posterity has little



to fear but itself, it should assuredly gain in gaiety as it loses in opportunities of bliss.

So are we led back to the question of pains and pleasures past and to come, which may here be examined in an aspect somewhat less general than in the course of our earlier enquiries. To this end, let me first ask: if I die this day, what next?

So far as I am concerned, anything that happens must happen at once; for, though this happening be the equivalent of a billion terrestrial years off, it must constitute, in my individual experience, the very next moment of time.

But what, now, is this individual experience? What *am* I that am dead?

For one thing, a bundle of brains, nerves, blood, and bones, the essence of which will go on with its characteristic activities and eventually be gathered in by the knowing.

And what else am I?

Clearly the thinking feature of these brains cannot depart from their other features and shift for itself. Such an emanation could have nothing in common with my earlier thought, all of whose memories, comparisons, inferences, consisted in the relation of new universal effects to that resultant of past effects called life. My thought was not ultimate thought; such as it was, it belonged to life. Each memory of mine was derived from a life-sensation; and the only

being that might singly prolong these memories after my death and so preserve my identity apart from life would be one that was associated in some way with my living thought yet was not wholly dependent upon life- or matter-sensations for its own thought.

Upon a moment's consideration it becomes clear that such a being cannot exist: in other words, that my ultra-evolutionary self cannot be independent of my evolutionary self. When I recognised, during life, the necessity of continuous and universal change, my ultra-evolutionary self was in evidence through my evolutionary self. That is to say, I had derived an ultra-evolutionary conception from the memory and comparison of evolutionary impressions. Each of these impressions was faulty, incomplete. According to the particular sense-organ receiving it, it appeared to be definite, perfect; but the memory of it, when compared with the memory of a conflicting impression, demonstrated the imperfection of both impressions. The similarly demonstrated imperfection of all impressions, however axiomatic, revealed the necessity that the processes manifesting themselves in evolutionary phenomena were only partially — *i.e.* symbolically — apprehensible to an evolutionary being. Since, then, all the evolutionary processes that occasioned my impressions were merely symbolical combinations of ultra-evolutionary processes and in no way distinct from them, it is in-

conceivable that, after death, the ultra-evolutionary self should be separated from the evolutionary. The acquirement of ultra-evolutionary ideas which shall dissipate strictly evolutionary ideas consists in the continuous and cumulative modification of evolutionary by *other ultra-evolutionary* processes up to that hypothetical point, never to be reached in evolutionary times, at which the ultimate factors in the evolutionary processes are all obvious. In one-dimensional terms, when stable groups of centre-changes have given sufficiently varied entertainment to one another's straying migrants, the possibilities of centre-change existence will be exhausted, and centre-changes must dissolve in favour of new alliances in respect of which our geometrical concepts together with our discussion of the spatial necessity illustrated in Figure 16 will be irrelevant.

When my heart has ceased to beat there is, thus, a complete absence of data for the existence of anything, now or but lately inside my body, which should be contemporaneous with and similar to the existence of my living successors upon Earth. My body, as has been observed, will be undergoing processes different in appearance from those which were called life; but there neither *is within* nor *comes from out* this body any representative of my living identity. I am extremely dead — dead as a door-nail. What next?

If any of my survivors have still patience to hear me preaching from my grave, they will hardly expect

my promise to join them presently in the form of a bird or a cat or to thrill their great-grandchildren as the hero dogged by a mysterious second personality. Such definite and picturesque reincarnations are no longer to be seriously considered even by deluded and bewildered man, who may nevertheless be compensated in other ways.

The delusions and bewilderment of man suggest another aspect of the case.

What, indeed, *was* I when alive?

I was indeed an idiot of the first water or perhaps, rather, a lunatic with rare intervals of semi-lucidity. Not only did I hold, unmoved, the universe within my palm, but in the immediate affairs of life of which I might have gained some useful understanding I behaved almost invariably like a blind and maddened beast. Only in death may be appraised the tiresome incompleteness of such a thing as I. Nay, my good respectable Self-respect, when all's said and done, I do not answer. Let others speak for themselves; I, at least, do not suffice. I am quite meaningless, inconceivable, save as a beginning or, say, an elementary stage. Dead, am I? Finished? Or what shall be said of this unfinished me?

The necessity of an existence to follow terrestrial death is thus as patent in the emotional aspect of the case as in the theoretical or the logical: there is no honest process of thought that fails, in the end, to bring home to us the slight significance of death.

As to the particulars of the relation between the post-mortem existence and the ante-mortem, it is of course impossible to say much that is satisfactory. That upon each of our individual dead begins at once the process of gathering by the knowing is necessarily true. But the nature and intensity of the earliest post-mortem consciousness; the rapidity with which this consciousness is developed; the manner of the eventual modification of terrestrial characteristics; the rapidity with which, and the circumstances under which, separate terrestrial identities become merged; the extent to which the process of gathering will be carried within evolutionary times, — upon all these questions any speculation must be largely sentimental in character. It seems highly probable that the process of gathering has always been in operation and is steadily gaining in pace; that all our dead are now conscious — so dimly conscious, as we should say, that the centuries speed over their heads like seconds; *i.e.* they are living more slowly than we.

When we examine an amœba, we resuscitate in some degree all amœbæ; and we regard this as about the finest thing that has ever happened to amœbæ — to become the subject of our scientific thought. The late amœbæ, to be patients, must be agents as well. In symbolical one-dimensional terms, the rotations originally set up by their migrants are still going on within us. In such wise must we ourselves, our loves and our politics, eventually be brought under the ultra-evolutionary microscope.

We have seen that, when I die, my future existence is to be looked for anywhere rather than within my body or in any emanation from my body. If my son experiences a desire similar to what I should have experienced under similar circumstances and modified according to the difference in these circumstances, there am I alive again. If it is truly similar, it is mine just as much as his; and even if it is very different, it is in some respect a bit of myself. If a stranger to my earthly self is informed of something that I said in life and in consequence gains a conception which he proceeds to modify in some such way as I should, under the new circumstances, modify it, there am I again.

Such "reproduction" of the individual life may, as we all know, assume considerable proportions before the death of the individual, so that a man may, as it were, absorb a considerable portion of his own family, community, or nation. Whether it may ever, at our present early stage of development, amount to a highly varied existence either before or after the death of the individual, it would be difficult to say. Doubtless, in most instances it would not; for the dissemination of the individual identity is deprived of obviousness by the inevitable grossness of illusion that belongs to our position in time. It would, at all events, be strikingly similar in its partial and apparent character to that individual life which is avowedly distinguished by each of us as

his own. Furthermore, it would be new, and each phase of it would be soon over in proportion to its tenuity; *i.e.* rarity of incident would mean the degradation of consciousness.

Obviously suggestive in its bearing on the life to come is the well-known principle governing the alternation of pain and pleasure. I believe there are very few persons impervious to the conception that pain and pleasure, like egoism and altruism, exist only in virtue of their apparent mutual opposition. That pain of some kind invariably follows upon the termination of any kind of pleasure; that pleasure invariably follows the release from pain; that the pleasure of gratifying an appetite implies the precedent pain of the appetite ungratified; that the pleasure of altruism is the sequel of a distressed sympathy; that the pleasure in an idea depends upon the pain inherent in the dearth of ideas; that a continuous succession of pleasurable sensations, if sufficiently prolonged, becomes unpleasurable; that pain, if maintained at a certain level for a sufficient period, is forgotten until its cause is pleasantly removed; that nobody can so long lead a monotonous life with satisfaction as one who has previously been the victim of much pain and sorrow; that no pain or pleasure is so great that it may not be indefinitely mitigated by the effort of a mind appropriately constituted and trained, — all these propositions seem always to have

been very generally agreed to by the most widely different minds. Doubtless the extremes of pain and pleasure have moved apart and will close up again in the course of evolutionary history even as a stable group may rise and decline in stability. However this may be, we have always to take account of the vast numbers of our fellow-men who are flatly and inevitably suffering physical and moral anguish in a degree that drives them to drink, to madness, and to despairing suicide. It is by no means their fault that their minds are not appropriately constituted and trained for successfully combating their sufferings, since but few of their more accomplished brethren have this power in any considerable degree. So long, moreover, as they are permitted to be born and to live with the odds so heavily against them, the utmost that may ever be done for them upon Earth is little indeed as compared with that which must be left undone.

It is unnecessary here to consider in detail the psychological aspect of this apparent injustice. Whatever may be the degree of, and the relations between, the enormously various alternations of pain with pleasure, we can hardly escape the conviction that certain members of any generation are very much more miserable in the sum of their lives than are the others. But that these present unfortunates must be compensated in full measure under the rule of destiny is an obvious necessity. For the



identity of their own suffering selves and of those of their children and of others who suffer after them cannot be lost but must, after death, enter upon an existence in which the pleasure of release and of the progress in knowledge or control of pain is proportionate to the degree of their sufferings upon Earth. Things will delight them to which their less suffering contemporaries will be indifferent. Conversely, any approach to satiety, whether of body or of mind, upon Earth means inevitably a slower and more embarrassed existence for some time after death. Let us briefly consider another aspect of our case.

“Those good old days when we were so unhappy” lose much of their retrospective charm when we face what looks like the necessity of living them over and over again to infinity. If always, when all possible knowledge resolves itself into the least possible knowledge, there begins the inevitable succession of all possible manifestations of Change, how am I ever to escape from that wretched moment in my earthly past which, but for the hope of putting it definitely behind me, would have made of all things a real and perfect hell? Am I not instead to go through with it an infinite number of times? And if it is to be multiplied to infinity, what more of existence can I have outside of it?

This is logic — and, on the face of it, sheer nonsense. Had we no means of assailing it from without,

we still might flatly repudiate it because of its internal implications. But the keystone of this phantasmal structure juts boldly out on either side for fears and hopes innumerable to hang upon it.

To traders, fighters, and law-givers, the word "again" is still available, even indispensable; but in the revised dictionary of a continuous universe we might as well look for "triped." That wretched moment of mine was indeed full of wretchedness, and I will say nothing of the relief attending my emergence from it or again from its consequences. Suffice it to say that it was in itself wretched, and that I put it behind me with an act of self-denial or a crime or a suicide. But then to suppose that I might ever add to the wretchedness of it in any way would be equivalent to supposing that I might duplicate myself by producing another self which, if it was indeed a self, would after all turn out to be not another self but the same old self. It will be remembered that in the present consideration of my wretched moment, the apparent menace contained in the terms "again" and "another" refers to the ultimate or cosmical implications of this moment, not merely to its evolutionary implications. This moment, then, or my wretchedness of this moment, is a definite apparent entity inimitable, unreproducible. It embodies the sum of certain experience or, in equivalent phrase, a moment of time. That it should be augmented with more experience, or reproduced

with the lapse of more time, is manifestly unthinkable.

Such is the theoretical — *i.e.* the real and indubitable — necessity of the case. But we may never forget that, though ultimately we are knowers, immediately we are liver; and it would be rash to suppose that this “again,” doomed as a word, dying as an idea, will quietly and painlessly relinquish its hold on evolutionary thought, or that it will ever be quite dead in evolutionary times. As to its ultimate implications, phantasmal though they be, there is even a kind of appropriateness in the instinctive apprehensiveness of living beings who, like ourselves, are still so crudely constructed as to be liable at any moment to outbursts of predatory and homicidal fury, lest the consequences of their acts be visited upon them over and over again. Some of us, again, may like to think that we can eat our cake and have it too. If, for example, you are a passionate poet, you may rejoice that your most blissful agonies are not disappearing for ever in favour of a milk-and-water existence whose only pain lies in ignorance of the number of sands of the sea and whose only pleasure lies in counting them. If, on the other hand, you are down on your luck, you may reflect that the fuller existence, in which luck counts for nothing, will be far longer in the living; that time — or experience — is cumulative; that the last moment of time will contain all the earlier moments.

In general we may be glad that we have none of us to dread either the diet of red peppers or of sweet biscuits. A single incident in the suppositional course of sustained happiness may be vividly conceived and powerfully executed by a painter; but the moment the kinematograph is mentioned, the picture must be given another name. And all our names will successively be rubbed out as we go on improving our kinematographs. Therefore he who proposes to treat of even the most theoretical considerations in words must expect an advanced posterity to be rather amused over his performance; and any attempt at dignity will only heighten the ridicule. But when we encounter one of those bands of theorists, now so numerous and various, who speak of God as the all-knowing, all-pervading, self-sufficient constituent of the oneness of things, we have no business to laugh as if it were the best joke out. Neither we nor they may know just what they mean by this; but the probability is strong that the basic influence which manifests itself thus curiously is one that will eventually make havoc of our traditional verbal tidiness. And those others who decline to look at any proposition not properly constructed of subject, predicate, and copula will scarce be heard of.

## CHAPTER VII

### IMMEDIATE IMPLICATIONS OF A RATIONAL VIEW OF DEATH

ON all sides we may witness the curious spectacle of educated men devoid of religion (as a working force) and of philosophy (save of the kind called practical) legislating for us, condemning or acquitting us, teaching us the meaning of citizenship, organising and conducting our charities. I write of those who are regarded as well meaning or tolerably disinterested; for they must work shoulder to shoulder with another class of men whose political, educational, and philanthropic projects are undertaken more strictly in the interest of self-advancement. The ambitions of this latter class, futile though they be and bringing no satisfaction with success, are more readily intelligible because of the ease with which they may be referred to the primal instincts of animal man.

The former class, armed solely with morality, have the presumption to swing this clumsy weapon about our ears and in its name enlist us in the work of interfering with our own chosen pursuits. For it is to be observed that morality is indeed a weapon,

not a revered idol or beloved symbol. Preëminent above all our time-honoured illusions by virtue of its intensely practical nature, it is to be seen solemnly hewing and carving amongst all those daily concerns of ours which we habitually regard as the solid facts of life, deny them though we must upon each second glance.

The achievements, or rather the single achievement, of so crude a weapon wielded persistently against a race that has shown a tendency towards increased complexity as illustrated in the transition from ape to European were easily to be foreseen. Upon the objects of its attack it has accomplished absolutely nothing, but has left off with each generation where it left off with a preceding one. In different climates and in different centuries it looks different to the eye, but wherever it has been at work the sole practical outcome of this work has been the gradual blunting of its own edge. When reason confers a benefit, morality does indeed sometimes get the credit, or perhaps we are assured that reason after all belongs to morality; when morality fails, a scapegoat is generally ready to hand. For morality, at its bluntest, is even now a tremendous force, not lightly to be impugned. The source of its influence is not far to seek.

Those who have read my first two chapters will readily acquit me of any desire to show specifically the points in common and the lines of divergence of

religion and morality. In the next chapter will be found a well-known definition of religion in the most general terms; but I have no wish here to take up the part played in either religion or morality by the reverence for ancestors, love of kin, love of woman, love of wine, sun, or moon. I merely wish to state explicitly what we have all learned from our own hearts and our histories, and what is inevitably to be inferred from the earlier considerations of this book: that what has made morality a tremendous force in the world is the fear of death and hell — ay, even among those who scoff at fire and brimstone — and the hope of an impossible heaven. Nay, the very mainspring of all morality is the impulse to preserve each individual being from suffering, death, or the loss of its soul.

Obviously this is as worldly and irrational a doctrine as any other; it takes account of time, yet attaches supreme importance to a life whose duration, as compared with known periods of time, is of the tiniest significance. And even if we ignore this curious limitation and take the supreme importance of the individual human life for granted, we soon find (as in the course of our investigation in Chapter II) not only that this most practical doctrine of morality has never had any practical consummation in the past, but that it cannot conceivably have any such consummation in the future. By any, therefore, who may adopt even as rational a view as is now

attainable of death and the derived bugbears of suffering and hereafter, morality must be set down as an illusion of inferior caliber: one which may already be treated as an anachronism and confidently opposed with word and deed. In consequence, the efforts of those disinterested legislators, jurists, and philanthropists mentioned at the beginning of this chapter must be regarded as necessarily barren of benefits to the race.

Confess, reader, as you look about you with candid and wide-open eyes, that philosophy is now the prime need of adult man, life itself being a secondary consideration. And parents, seize you the first opportunity to teach your growing children that a fact cannot be stated. If they then accuse you of doing what you proclaim to be impossible, you will show them that the more specific the statement, the lower its value; that your first statement has the highest value of all. For religion can no longer be believed in, and morality is in a similar case, though even worse off, for we do not like it, we never have liked it, and we never can like it.

I propose now briefly to sketch the manner of life of a race whose intellectual and political leaders, at least, should take a tolerably rational view of death: a view which denies to death any special importance of its own as a thing to be fearfully shunned or imperiously courted.



Certain celebrated and important problems of civilisation will not be considered because the amount of detail necessarily involved in such considerations would be disproportionate to the importance of their inclusion in a sketch of this nature — the more so, as the general bearing upon these problems of the principles of conduct here to be defined will be perfectly clear. Thus, neither property nor government will receive a separate consideration, although it will be seen that these two institutions, now so complex in character that morality itself might unaided work very radical rearrangements in them, would soon, under the more rational régime, be classed among the simplest and least engrossing of all problems.

Instead will be chosen for consideration a few of our most elementary concerns in which morality must always remain powerless to effect any lasting modification. I shall point out how the race in question would deal with its drunkards, amorists, liars, brawlers, invalids. And as the test case, to be treated at greatest length, I shall select that of the drunkards, both because alcoholism is one of the most important elementary problems in the countries in which I have lived and travelled, and because it is in itself well suited to the purpose in hand.

Unbiassed reformers of our present generation and of all times known to history — unbiassed, *i.e.*, by

any strong personal inclination to drink — have generally tried to dissuade their fellows from drinking, and especially have they tried to remove opportunities for drinking from the paths of men who have made of drinking their chief concern in life.

Now, of the hypothetical race to be brought under discussion, I assume that it is in all respects similar to our own save in the more rational view of death taken by its political and intellectual governors. I assume, for example, that it is composed, in respect of alcoholism, roughly of three classes of families, clans, or subdivisions of the race: (1) families who have for generations been temperate or abstemious; (2) families who, in the main temperate, have nevertheless at intervals or through intermarriage or through the exceptional environment of an individual or generation, produced intemperate individuals; and (3) families who, though notoriously intemperate, have, either in the natural course of heredity or through the imposition of artificial restraint, produced temperate or abstemious individuals. It is to be observed that the logical class (4), the opposite of (1) — families invariably intemperate — or anything nearly approaching it, could not exist. I likewise assume that the governors of this race, whether the few or the many, are generally convinced that, so long as the race continues to exist under conditions at all similar to those actually obtaining, alcoholic beverages will continue to be

made and will at times be accessible to any whose desire for them is sufficiently great; that the project of controlling the production and distribution of spirits so that in all times of peace or strife they should be available only for medicinal and mechanical purposes is too chimerical to be worthy of serious consideration.

In the laws of such a race — if written laws there could be — it would undoubtedly be accounted something like a misdemeanour to withhold from the drunkard his cup. The more congenial were a young man's first experiments in intoxication, the more studiously would he be provided with occasions for pursuing them. The intemperate husband who should find in his wife a ready imitator would be seconded in his efforts to reduce her to his own condition of servitude. The forcing of wine down an unwilling throat on the plea of friendship, respect, or common hopes would be regarded as presumably futile and certainly barbarous. But every adult man and woman would be encouraged to pass seriously the test of alcohol; and those who should decline to do so would be regarded as suspicious characters, inferior in the social scale to those who should pass from this test to a drunkard's grave. Even as the drunkard would not be suffered to ply the unwilling drinker with liquor, so would he be prevented as far as possible from working any other injury to his family or his fellows. Upon the first

hint of mischievous intent, he would be confined either by himself or in a colony of drunkards to whom spirits would be supplied either through their own means or by the state or by philanthropic individuals.

In the life of any race, otherwise like our own, that adopted this attitude towards alcoholism, three processes already known to us in theory and probably in actual operation in our midst would at once acquire a vastly greater scope and a proportionally higher velocity. They might, and doubtless would, be to some extent mutually exclusive; how far they would so overlap is of no great moment in this discussion, the purpose of which is to show that the outcome of their unhampered operation, given sufficient time, would be the complete elimination of alcoholism as a factor in the racial life, and that the greater their scope and velocity, the more rapidly would alcoholism decline in importance.

(1) Everybody would realise that upon his own unaided efforts would depend the outcome of any conflict, actual or problematical, between his other aims and the desire to drink. Supposing this conflict already to exist, he would know that society, far from being ready to pull him up at critical moments and give him a fresh start, would take the opposite course and try to remove all hindrances to his inebriety save only his own unwillingness to drink. There can be no doubt that responsibility of this

kind, rarely and imperfectly as it has been realised in practice under our own civilisation, has been the making of many a man, nor that the self-control derivable from it *may*, according to any possible theory of heredity, appear and reappear in successive generations as an active foe of alcoholism. In the case of our hypothetical society which thrusts this responsibility upon all its members, the general interaction of minds and the force of bright example must greatly increase the working value of self-control in many individuals.

(2) We have now to consider the results of that interaction of minds which is very generally in operation under the actual régime of morality. The demon of drink is painted by our reformers in the most lurid colours: its guile is voluptuously satanic; its retribution swift and awful. On one side, the joyous carouse, the god-like intoxication; on the other, the poverty-stricken home, the deserted wife, the criminal's cell, — this pictorial antithesis is familiar to all who belong to a bibulous nation. Amongst people of means and education the contrast is, of course, not so vividly drawn; nevertheless the youth of average unsophistication goes out into the world feeling that a monster lies there in wait for him — a monster whose fascinations should indeed be proved, but whose cruelties should be anticipated and avoided with the utmost agility. Knowledge of this creature is often dearly bought,

the knowledge itself being of so flimsy a nature. For — though it is not the purpose of this work to assign any value, however provisional, to the power called suggestion — it must be admitted that only a man of exceptionally strong mind can, in the business of drinking, give fancy and curiosity free play without coming repeatedly under the shadow of those lugubrious possibilities which, if he belongs to a drinking nation, he has always been taught to associate with this practice. A more submissive fellow will look for a reaction to follow his first glass of the day and will thus explain the first physical or mental depression of the afternoon. Though his experience warn him that the second glass is less palatable and exhilarating than the first, this experience may count as nothing against the time-honoured dogma that liquor demands more liquor. If he finds that he cannot comfortably lead a tippling life, he may decide that night-long indulgence followed by week-long abstinence is the most satisfactory compromise possible with this exacting slave-driver: a compromise which, as we have all observed, does not generally remain long in force.

Everywhere may we see wine-lovers, still sound of nerve and body, executing various fantastic steps in obedience to the dreaded whip; and as their liquor gets the upper hand of them, the dance grows faster and more hysterical, the doctor aiding the disease as if such a spectacle could not be too far prolonged.

Meanwhile science stands by, cool and canny, applauding feebly from time to time; for she has told us that more than a certain insignificant amount of alcohol may not be consumed daily by the healthy human body without leaving its unmistakable and demonstrable marks upon nerves and tissues, and that to enquire if these inroads into nerves and tissues might be the price paid for general and significant benefits would probably be futile and certainly inexpedient.

With the hypothetical race under discussion, it is clear that no such emotional considerations as have here been mentioned could weigh in the scale of individual choice. The influence necessarily exerted by a rational view of death upon personal affections and ties of blood will presently be discussed, even though it may appear to all readers immediately obvious. For the moment it is sufficient to point out that under such a régime alcohol could hold out neither the attractions of forbidden fruit nor the terrors of an inexorable master. The fruit, instead of being forbidden, would be prescribed; if it should prove harmful, relief from its consequences would be ready to hand. Drunkenness would be regarded seriously, as a foe to be despised and removed; not solemnly, as a foe to be dreaded and abused. Drunkenness would be a loathsome vice for which the confirmed drunkard could no longer be held responsible. One who should decline to pass the test of

alcohol would also be held free from responsibility for his act, which nevertheless — containing, as it would do, a menace to the future welfare of society — would stamp its author as a backward member of the race and inferior to the drunkard in the social scale. Hence those who become addicted to alcoholism through resistance to the opposition of society or through a superstitious awe of the power of alcohol must rapidly decline in numerical and social importance.

(3) The third process in the life of our hypothetical race that would be greatly accelerated by the adoption of a rational attitude towards alcoholism is readily to be divined; and to those who regard alcoholism as, above all, a disease of the body subject in but slight degree or rarely to intellectual and moral influences, this process will be deemed by far the most important. It may be termed the elimination through natural means of those individuals, families or subdivisions of the race who, in respect of alcoholism, have shown themselves least fitted to be factors in the posterity of the race.

When the constitutional or incurable drunkard is given a free hand, — is hindered by neither poverty nor police, — he will speedily destroy himself. If, at the outset or in the middle of his downward career, he were able to secure a wife and beget children, — which, as we shall see, would soon come to be an unheard-of occurrence in our hypothetical



society, — these children or their children or grandchildren would sooner or later find the odds heavily against the persistence of their stock: they would be objects of special suspicion, and no pains would be spared to demonstrate their fitness or unfitness as parents. Hence wine-lovers whose self-control or whose reasonableness of temper should be inadequate to keep them from excess would gradually disappear from posterity, whilst dipsomaniacal outbreaks of whole sections of the race would be unknown. The theory that this process has already been long in operation despite the formidable obstacles it has everywhere had to encounter, and that its results are both important and conspicuous upon Earth to-day, will not here be considered. Our hypothetical race removes all obstacles; this being the case, any known or conceivable theory of heredity must include the eventual elimination of new possibilities of alcoholism. Strictly speaking, alcoholism would be transmitted to posterity only as an obsolete illusion steadily to decline in importance relatively to the sum of experience; not as a factor in posterity able to hold its own with other factors by virtue of the cumulative results of its renascence in generation after generation.

On the other hand, no theory of heredity could of itself include the elimination of alcohol. Wine is enjoyed by so many people that there must of course be virtue in it: alcoholism rationally dealt with

means the elimination from posterity of all but those to whom alcohol is distasteful or immediately injurious and those who gain substantial benefit from its use.

It is quite in consonance with the principle of continuity that nature herself should point unmistakably to the cure of alcoholism. The death of the consistent drunkard is the best part of his life. It is painless and so conspicuously free from the fear and remorse that beset many another death-bed as even to suggest alcoholism as a tolerably scientific means to suicide; whereas the drunkard's efforts to regain his sobriety are invariably attended with the most cruel hallucinations of horror or remorse — hardly a suitable legacy to be passed vainly on through hundreds of generations of creatures calling themselves rational.

Before enquiring how posterity would get on, with all potential drunkards eliminated, or how the different classes of our actual society might regard a growing disposition in their midst to adopt the immoral attitude towards alcoholism that has been outlined above, let us briefly consider the rational and immoral method of dealing with some of our other elementary problems.

By amorists I mean the whole race of human males and females: women presumably by virtue of their essential impulse towards motherhood;

men presumably because women have always—by their self-imposed isolation and separate development and by innumerable devices of modesty and coquetry varying according to the circumstances of the age — appealed to their curiosity and so brought them to serve their purpose. Whether the above is a good statement of the case is here a matter of no great consequence. If it is indeed a good statement anthropologically, there has always been reason in the sexual relation just as much — or just as little, if you regard reason as already an obsolete term in every sense — as in the will to live or in the mutual attraction of Sun, Moon, and Earth. If some other statement is a better one, you will still find the same kind of reason in the relation described. The point here to be observed is that there exists generally a mutual attraction between the sexes. Exceptions to the rule, being rare and rather dubious, will not here be considered.

Now, a rational view of death, as we have already seen, must affect in many interesting ways the lives of them who adopt it. For one thing, freedom of intercourse would in our hypothetical society be greatly increased, for social reserve must inevitably appear ridiculous. The average man would know a hundred women better at the end of an hour's acquaintance than he now knows ten after a lifetime of friendship. No secret would be made of physical characteristics that were deemed significant.

Woman might indeed be put to it to preserve her supposedly needful isolation except for the fact that increased freedom of intercourse would vouchsafe to more men, each his particular and inexplicable mystery of love — the love that is inevitably to be taken for granted in any consideration of our human race.

Moreover, in a society that should confidently regard posterity as one of its most intimate possessions, it is inconceivable that considerations of property or of class, as we now understand them, should limit the choice of a mate.

None of the systems of human breeding such as have hitherto generally prevailed in our aristocracies, our bourgeoisies, our proletariats, have furnished us with any very interesting or conclusive data for future use. Science, unlike morality, has not been suffered to interfere systematically in many of our elementary human activities, least of all in this one; hence, though a number of negative conclusions have been recorded, it has been difficult to say anything at all definite as to the comparative physical or mental characteristics in the two parents which make for a promising offspring. In default of any evidence to the contrary, I venture to affirm that in my hypothetical society more generally than in the actual world would the mating of men with women be governed by love. If love be described as a man's unexplained preference, momentary or enduring, for

whatever he knows or divines of the body and mind of some particular woman above all other women known, remembered, or dreamt of, I must deny that it is ever altogether absent from the most egoistic and brutal of conquests. In the matings that I have in mind, love would not be at its minimum, but would be both powerful and resourceful; and it seems to me highly probable that the evolutionary secret of an active and progressive posterity would be discovered if love were no longer fettered by social reserve, cupidity, prudery, snobbery, and the rest.

How many women might be loved successively by a single man is a question upon which no satisfactory speculation seems possible. Probably a very large proportion of the race would be monogamous, not on emotional or moral grounds but from inclination. For, howsoever we describe the motive, — whether as love, curiosity, lust, or an impulse to propagate one's kind, in any of which the rational basis is as indefinable as it is indubitable, — the effect of a consciously rational attitude toward life must be to increase the opportunities of congenial mating. In the actual world there are very many men who would not give up their wives if they could after a year or twenty years of life together. In our hypothetical world compatibility between mates would far oftener be realised. Far oftener would a man be enabled to meet and mate with a woman of suitable age, similar conjugal aims, and different

temper. A free and active spirit demanding much of life would more often emerge from any narrow circle whose resources he had early exploited and take to himself a woman whose antecedents were entirely different from his own. But few, of course, — and those the most idle and backward, — would regard as suitable any such matches as are now so regarded by our moral, social, commercial, and insular Philistinism. Northern people would mate with Southern; Eastern with Western. She who was especially suited to child-bearing would be sought, and with good chance of success, by him who should bid fair to be a normal father. Conspicuous abnormalities of all kinds would be left to themselves or to one another. The Casaubons and the Hedda Gablers would mate with one another or not at all, for nobody else would want them; the Neros and — their female counterparts, who have never been sufficiently interesting to achieve a crystalline celebrity in polite history or verse, although we all know them in actual life. Amorists, in sum, like drunkards and abstainers from drink, would as far as possible do as they liked, not as they thought dutiful or expedient.

From the above considerations of alcoholism and the sexual relation may readily be derived the general attitude of a rational régime toward all eccentricities of temper that would obviously hinder the efforts of posterity to benefit thoroughly by the new experience within its reach.

By liars, as by amorists, might well be understood the actual human race. The possibility of many liars in our hypothetical society is of course extremely dubious; we may note, however, the position occupied in such a society by those individuals whose mendacity is habitual and not necessarily connected with any motive of material gain. This kind of liar, whether deceiving others as to questions of fact or himself as to questions of principles, is above all a talker, for he cannot believe what others say and so cannot listen with interest. But he could not gain the ear of any who feared neither death nor suffering, and such would be the political and social leaders of the rational régime. Hence he would be out of it, not wanted — instead of being in great demand as at present. He must then either disappear from the race or else turn thinker and listener as well as talker, and so cease to lie.

Brawlers — those who delight in using their fists in a little fight or their minds in planning a big one — would not be allowed the freedom of the whole Earth, but would be given a liberal portion of the lands and seas in which to pursue their chosen career. They could not, of course, decline the gift without appearing ridiculous in their own eyes. When separated thus from the peaceably minded, it is possible that they would suddenly find their occupation gone; otherwise they could get up wars between

ideal armies composed entirely of true fighting men. In either case, the police which should keep them within limits would probably not long be needed. Returning warriors would people all our golf links where they would doubtless find dromy four as stimulating a problem as the conquest of a rock fortress.

Invalids, again, would be allowed to do exactly as they liked provided their acts did not clearly endanger the welfare of posterity. In certain cases, doubtless, efforts would be made to keep them from suicide. Or, if their sufferings or impotence were thought to be disproportionate to the probable advantages upon Earth of their ultimate release or restoration to health, they would be given every encouragement to suicide even to the point of being socially neglected. The same rule — which amounts to the absence of all but the most necessary rules — would be followed in the case of the aged. By the natural consequences of their incompetence some would be driven to suicide at fifty, others perhaps not till ninety. Eventually, doubtless, nobody would die a natural death as we now understand it, because others would be trying to lead a natural life.

The foregoing sketch of the attitude towards certain practical problems of life to be derived from a rational view of death makes no pretension to



accuracy of detail. Certain contingencies have been supposed which would probably never arise; others, certain to arise, could not now be foreseen. Hence the omission of the problems of property and government. It is obvious that, under the rational régime, these two problems would be of the simplest, for there could be no disputes over ownership or leadership. It is equally clear that they are now of the most complex. To demonstrate the character of the transition would be beyond the power of any man, and to represent, however roughly, any of its stages seems beyond the province of this work.

What I now wish to point out is

(1) that this hypothetical society, or something essentially like it, is possible upon Earth;

(2) that it would not be a kind of rational millenium;

(3) that, far as it is from either millennial or impossible, it is not to be had for the asking.

(1) In the first place, a view of death sufficiently rational to admit of the attitude toward life described above is perfectly feasible: the grounds for it have been provided in this work. It is perfectly possible to improve upon that rational error which has been called the will to live in the face of certain misery, for many have done this, dying without despair. And if individuals scattered through the centuries

have done this, we can place no limit to the number that may do it in unison. Theoretically, moreover, we must regard as accessible to the mass of mankind a conception which is inevitably to be perfected by the universal descendants or knowing cousins of mankind, — provided nothing prohibitive of such a conception pertain to the home of mankind. But death takes place upon Earth. Hence it may be viewed by the inhabitants of Earth in a manner indefinitely more rational so long as Earth remains habitable. A sufficient number of experiences in which the idea of death should be implicit would lead to a perfect conception of death; and the net results of growing experience, however imperfect, must be improving conceptions.

In the foregoing sketch, a certain attitude was described as “rational and immoral”; which was only a brief and convenient manner of speaking. Morality is, of course, a rational system and a crude one in the eyes of them who perceive that the growing experience of its authors has reached a point — or is soon to reach it — at which the view of death enforced by moral syllogisms must be abandoned if the race is to have further experience as a race. Since the growth of cosmic experience cannot be checked, the alternative thus presents itself: disappearance either of morality or of the race that invented it. And since the race has already produced a goodly number of individuals who have

dispensed with morality in theory and have practised it, if at all, only for convenience or to be able the better to attack it, the issue of the dilemma seems not difficult to predict.

Some, doubtless, would prefer to regard what I have called the disappearance of morality as the evolution of morality and would like the code embodying any new rules of conduct to be called a new morality. Theoretical justification of the most roundabout kind could perhaps be found for these terms, to say nothing of the question of expediency. Evolution of reason would, to my mind, be a more suitable term: morality being the older manifestation of reason; the new manifestation differing from it in the most important practical points.

The bearing of this evolution of reason upon the bonds of affection and friendship as well as upon all "humanitarian" considerations is obvious enough and demands no detailed discussion. The interested reader will probably do exactly as I have done myself. I have conjured up instances of the operation of reason in my hypothetical society at which I have fairly sickened. But so have I sickened at the knowledge that a surgeon's knife was buried deep in the body of a friend in the next room. Less sick, though, was I than they who regarded the surgeon's knife as a useless and cruel implement.

No rational mother could wish to reclaim her son from drunkenness by artificial means. If he had

shown himself unselfish and lovable save for this weakness, she would carry an unsullied image of him down to posterity; for she could not wish this image to bear the stain of a bad example, nor the age-long existence of them both to be marred by a few years of eccentric and unsatisfying indulgence. "Till death us do part" is a phrase that could not be used to express the limit to any relations existing in our hypothetical society, death being indeed no more than an anæsthetic — an incident of the operation that sooner or later becomes necessary for the renovation of all human relations.

To consider, now, another aspect of the possibility of this society:

If we suppose (as the extreme case) that the human race should come suddenly under the domination of a rational party; that no potential drunkards should develop either a victorious self-control or a wholesome scorn of the power of alcohol; that drunkards, morbid amorists, habitual liars, constitutional brawlers, and confirmed invalids alike should die without issue, — there would still remain a human race; for we all know plenty of men and women innocent of these or any other eccentricities in which governors so meagrely equipped with knowledge as our rational party would presume to interfere.

In time, probably, the numbers of the race would be immensely and deliberately reduced. This is

frankly guesswork; for man's increased knowledge of and power over his surroundings might conceivably bring about conditions of life under which it would be possible and highly desirable for the race to multiply even beyond its present proportions. But, under any conditions that may now be predicted, humanity would doubtless be better off if it should count only as many thousands — perhaps hundreds — as it now does millions. It could then live a far more complex and varied life by virtue of the removal of those cumbrous institutions whose complexity is now the despair of us all, none of us pretending that a study of them is even stimulating to the mind, since they are all based upon the crudest and most obvious illusions.

I shall not attempt a detailed survey of the contraction of our uncongenial activities and the expansion of the congenial ones that would follow upon the adoption of a rational view of death. A few of the more important heads may, however, be enumerated.

There could be no armies, navies, or churches; of lawyers, politicians, bankers, merchants, few if any; no diplomatists; fewer doctors proportionally than now. The production of corn and other articles of food would be somewhat less per capita than now, since waste could be more easily avoided. The relative production of steel would be immensely less because the railway mileage, the vessel tonnage, and the number of steel buildings would be less in

proportion to the population,<sup>1</sup> to say nothing of arms and armour. Coal-mining would be the affair of a few weeks in each year, and the production of gold, silver, and precious stones could be discontinued for centuries at a time. Important economies of labour could be effected in the production of cotton, linen, wool, leather, and silk; and the demand for wines, spirits, tobacco, opium, and similar products would be greatly reduced. The drudgery of life, physical and mental, must in consequence be very much less than it is to-day, and nobody would escape his share of it. Doubtless, one who should be preëminently good with his hands or his arms would prefer weaving or spinning, or even hewing or digging, to singing or watching the stars or doing nothing, — we cannot comprehend the awfulness of doing nothing unless we realise that it means not even doing anything vicious, — and such a one would probably find musicians and astronomers eagerly awaiting him at the employment bureau.

<sup>1</sup> The railway mileage and vessel tonnage would be relatively less because ships and railways would not be maintained for purely commercial purposes, whilst corn, beef, steel, coal, etc., would not need to be transported enormous distances from the places where they were produced. Moreover, it would not be necessary to become a desultory tourist for want of something better to do. The contracted human race would be settled in regions each of which produced a considerable portion of the necessities of the age, and with ample means of communication for any who wished to travel. There could be no such congestion in cities as at present nor, consequently, the need of steel buildings in a region where iron was not plentiful.

Some of the most brilliant and potentially useful men are now seen as free lances in the fields of literature and the fine arts, either because their rebellious tempers compel them to distrust more orthodox methods or because irregular habits or lack of persistence unfit them for steady work. The producing power of such men must be far greater in our hypothetical society, for nobody could wish to make their rebelliousness the cause of their downfall, whilst they would themselves be freer from the obsession of original sin which now so often causes irregular habits or lack of persistence to end in stultifying vice.

In sum, the members of a race that is purged of its cowards, brawlers, drunkards, and the like must inevitably be freer to devote themselves to pursuits which are not distastefully obvious to all and to follow each his individual tastes: to be farmers, gardeners, mechanics, inventors, sailors, fishermen, sportsmen, teachers, scientists, philosophers, poets, musicians, builders, painters, sculptors, and still have time enough for their own cooking and washing. The most stupendous joke of modern times is the cumbrous machinery of our civilisation, Aha! No satire has begun to do it justice. But when you stop to think that you are part and parcel of it all, you must laugh out of the other corner of your mouth, Ah'm! We shall presently consider some of its solemn disadvantages. Meanwhile —

(2) Some readers may think it odd of me to be at pains to point out that my hypothetical society is not a kind of rational millennium. To these the mere knowledge that it must still go on recording and comparing the same kinds of facts that we now deal with would stamp it as necessarily a very primitive affair. But I am rash enough to hope for readers from that class which comprises nearly all readers and which regards the facts of the life it lives as having a perdurable solidity; which not only believes that  $(2 + 2 = 4)$  has been visibly demonstrated to it as a truth for all time, but looks upon liberty, equality, and fraternity as the highest of human ideals, however inexpedient it may be, at any given moment, to take steps toward realising this ideal. In addressing this class it would seem advisable to be as explicit as possible over any such matter as the millennium, because its members are generally so engrossed with the problems of government, property, charity, and international relations that, if you describe to them a society in which there is practically no vice, disease, poverty, or disputes over property, no nations to war with one another, nor anything to prevent a man's doing pretty much as he likes, they are very apt to tell you that you are describing the millennium — a lovely ideal to keep in the back of one's mind, but hardly so suitable a goal for immediate practical reforms as something a long way this side of it.



I must therefore suggest to these good canny substantialists that, if they will but gently prod their imaginations, some facts and necessities may pop forth, quite of their chosen variety, which should convince them that my hypothetical society is separated from any millennium by a distance so enormous that it may well be at the very next door to our own imperfect selves. Indeed, once established, it must first of all proclaim: "How helpless we are; let us to work! The heavenly bodies sail serenely on in their accustomed spheres; we are but dimly and distantly aware of them, yet they seem to us symbols of a splendid and orderly progression, whilst here upon this pin-point of an Earth, which is itself a mighty riddle, reigns chaos indescribable. We, its creatures, grope blindly toward ends which always elude us at the last. Only the chief and general end can we understand, for it meets us at every turn and we cannot escape it. All our acts and all the processes without us show convergent lines which, if we try to bend them, vanish along with their starting-points. But the How? — here is the sign of our incompetence. Let us by all means to work. For we have not yet learned how we shall eat, drink, or sleep; walk, run, or rest; beget or conceive; build or destroy. In the minds of our children there is little we may read; we stumble forward with them to almost certain disappointment. And not only are we all bad at most things and good

only at a few, but each one regards as suitable a different manner of life and a different manner of death from all the others, so that to each the others are incomprehensible. Here are indeed matters to put our teeth into."

The most casual honest scrutiny of this millennium of the nursery shows it to be nothing more than a manner of speaking, mere baby-talk in fact. The society thus curiously labelled is really but a step from the one in which we live — a step so short that an hour's honest use of their wits by a few hundreds of people should end in their beginning with the utmost confidence to pave the way. No such important revolution has taken place within the memory of man, for indeed — if the histories are not in error — nothing of the kind could ever have been expected. And to argue that man is not likely to cast off morality because he has clung to it through some thousands of years is precisely like arguing, as a child will, that a chick will probably not break its shell and come out into the light of day because nothing so striking as this has ever happened to the chick before. Grown-ups, on the other hand, have either witnessed the hatching of other chicks or have been told enough of what is going on inside the shell to realise that it *may* be broken.

There is nothing to prevent the realisation of my hypothetical society within the space of a year from this day — absolutely nothing *except* native

stupidity. Moreover, it is impossible to entertain serious misgivings on the point: to say, for example: "It looks rational, sensible, good, inevitable; but what of the limitations of the actual age? In the hour of disaster, scores of our people go mad with terror and bereavement whilst thousands turn with the most convincing passion and sincerity to the relics of a saint, averter of scourges. The race is almost entirely made up of people like these and of others whose superstitions are but a trifle less crude. If we try to impose novel syllogisms on these unseasoned masses, the immediate consequences may be the opposite of our intention: we may all be plunged into an era of barbarous gloom. Then, where should *we* come in, the reasonable ones? Where would anybody come in?"

Such reflexions are manifestly out of the question. I will say nothing of the theory that great benefits are to be attained *only* through great tribulations, for I do not believe in this theory. I must, however, point out that to any who may regard my hypothetical society as "rational, good, sensible, inevitable," anything is better than to submit to the actual régime. Better, a thousand times, to witness an opening era of barbarous gloom than to continue to live morally. Take this philosophy seriously and you must break the law — as sensibly and unselfishly as in you lies; and you must go on breaking it until it is past repair or you are yourself broken. Mis-

takes you will make which you will not care to repeat; but to keep yourself from error that is intolerable, break the law you must.

The prospect is clear enough: man must either come out of his shell or die absurdly inside it; but it is clear only to those who will stop and think and cease to fear, — cease, that is, trying to glorify themselves whilst they may.

(3) And unless I am a poor judge of the times, the hour of hatching has not yet arrived. I need hardly say that I have neither the wish nor the power to discourage others from working for that practical end which I myself most cherish in anticipation; yet I cannot believe that any purpose is served by withholding an honest opinion. Therefore, much as I wish I may prove wrong, and fully as I realise that the more immediate and practical the problem, the more dubious must be any diagnosis of it, I must record my belief that the times are outwardly too peaceable for any new and considerable social movement to gain headway. Let me explain what I mean by "outwardly too peaceable." Though much of what I shall say has been said over and over again, I believe I differ on one point from most of those who complain of the general apathy or opposition with which all novel ideas and propaganda are at first greeted.

The outward aspect of the three great classes of

society when confronted, as they are from time to time, with such a proposition as "Morality must go," is familiar enough to all interested observers. From the three classes I, of course, exclude the handful of people who try to think for themselves and, in so thinking, succeed to some extent in forgetting that species of reason which we commonly designate as emotional considerations. And by the three classes I mean classes as they exist to-day, and roughly as they have existed in certain other periods of history.

The Proletariat or that portion of them to whose ears the novel proposition has penetrated, receive it in dumb wonder, perhaps with dismay; but generally the first question they ask themselves is whether it contains any possibilities of more bread and beer; for they, poor things, are greatly in need of both.

The second class, the Philistines, is by far the most important and influential, although it often finds an ally and leader in the third. It comprises nearly all our successful merchants, great and small, financiers, legislators, lawyers, men of letters, and doubtless most of our other artists and scientists as well. Now, the distinguishing feature of this class is generally said to be its complacency, and it is just this complacency that I do not believe in. I admit that this belief is based solely on my own personal observation of a limited number of people

who often appear to furnish conflicting testimony. Hence my attitude towards it bears no intimate relation to, but is utterly different from, my attitude towards the central doctrine of this chapter. Let me, however, give my opinion for whatever it may be worth.

I have known plenty of Philistines of different nationalities and have never remarked that they ate, slept, or kept their temper better than any others; that they found their church in better agreement with their desires and ambitions; that they gave their women especially good reason to rejoice in the prospect of their fidelity — one may guess how they would generally take this ambiguous clause; — that they were preëminently free from mutual jealousies or distinguished for their ease of manner in all circles; that they felt pleasantly secure in their possessions or in their foothold on the ladder of fame. In sum, I have never been able to see any truth in the dictum that Philistines are especially content with their relation to church, state, society in general, matrimony, or to any other form of law to which they submit, and that being content in these respects, they satisfy their need of change within the limits prescribed by law or in regions in which law is lax or mainly irrelevant. Moreover, nearly every Philistine I have ever known has on occasions held up the mirror and seen himself there, Philistine, big as life. This act represents the best thought of the Philistines and is a death-blow to complacency.

What I have actually remarked in Philistines is not complacency, but a feeling that they have good reason to be complacent, — a feeling which naturally leads to moments of complete surprise at themselves and at one another. Laws go without saying. They obey the laws — at least more conscientiously than any others. Hence they should attain as great a degree of happiness as is possible in this imperfect world of ours. It is of course very irritating to people who take themselves seriously as conscientious members of society to find themselves exposed to a whole list of disappointments which the most rebellious of sinners may escape. For my own part, I believe it is not for nothing that I have witnessed the dismal outcome of marriages that had looked suitable, of systems of training that had looked practical, of national projects that had looked patriotic, of philanthropic schemes that had looked prophetic. For I can no longer reproach the Philistines with a selfish disregard of the complaints of the minority, but must pity the constitutional cowardice and stupidity which prevents their taking the first step towards a degree of independence commensurate with their wits and opportunities. Law we must have, at least while we are so many hurtling against one another. But just as a man of fifty must look sharp to justify his years, so law that has persisted for as many centuries must be open to grave suspicion especially when it is proving inconvenient to its Philistines.

I have been speaking of Philistines as they appear in times like the present. We shall see directly how they shape in times when they perceive less reason for complacency. But meanwhile we should briefly rehearse their attitude when confronted, in outwardly peaceable times, with such a proposition as "Morality must go." Very generally and quite simply they call it madness and its author a lunatic; and this is by no means a cowardly judgment. Cowardice, or stupidity, has established the point of view from which they must regard any proposition; but the particular judgment pronounced — at all events in the case of morality — is quite sincere. To most Philistines it is also sufficient, and by these the matter may be put aside. Some of the learned ones, however, enjoy demolishing at length the argument against morality, which is done by showing that it contains no explicit answer to certain remarks on the subject made by one who has enjoyed some twenty centuries of standard immortality. Others with a still more pronounced turn for controversy prove that the author has quite simply and consistently been substituting black for white. This is an easy and telling refutation, since recognised opposites such as black and white need not be otherwise defined. Still others, discovering in the text a sportive phrase or two such as could never escape the pen of one who was dealing seriously with a subject like morality, acquit the author of madness and



of revolutionary intent alike, and show that he has merely been indulging in a sophistic *tour de force* for the amusement of himself and of any who are clever enough to guess his meaning.

Not only are the Philistine's notions of logic extremely crude, but it is rare that he will admit at the outset that there is a chance for argument in favour of a principle that is the opposite of one he has been brought up on and has never thought of questioning. The moment he realises that you are entering on such an argument, his whole nature is up in arms against the beginning of your next statement: he has no need to wait for the predicate, for the very words with which he is so familiar have a new and unreal sound as they come from your lips. If of a comparatively placid temper, he listens comfortably, heedless of the argument but mildly amused at its practical outcome. If of a sympathetic temper, he is sorry for you; if neurotic, he protests vehemently against such obvious absurdities; or if he is endowed with rather more than a Philistine's share of curiosity, his efforts to follow the argument will probably leave him bewildered and mentally exhausted.

For any fancied purposes of action or serious thought all Philistia, if left to itself, remains unmoved by novel propaganda. We generally describe the Philistines as our utilitarian folk, devoted exclusively to practical pursuits. An equivalent char-

acteristic is their reluctance to put any obvious series of direct questions to themselves, to the world in which they live, or to history. For, indeed, one question begets another as waves of the sea beget other waves; and all enquiries must either roll out to an ocean-wide unknown and so appear futile to Philistines or else dash against the rocks of a law which they regard as more enduring than does the physicist the law of gravity.

Hence the Philistine's deep distrust of philosophy and his curious dictum that philosophy has never accomplished anything of general and enduring value — as if philosophy were presumably inferior in this respect to religion or military science. Hence, too, the probability that whatever new tinge his attitude of indifference towards novel propaganda may receive will be one of resentment.

I will pass over the practical and unthinking pessimists — Philistines who desired success above all else and failed — as presenting no points of special interest in this discussion, and next take up the third and smallest, though by no means always the least important, subdivision of society.

Let me name them Idealists, as they have been named before, and without reference to current philosophical terminology. These are people who deal extensively in ideas as a jeweller deals in precious stones, building them into beautiful ornaments of life. Woman is to them an idea, fixed and immu-

table; manhood another such; and a favourite problem is to weld these two ideas into an institution of marriage or of free love, as the case may be, that shall be finally sanctified and universally revered. Similarly, true altruism must always warm the cockles of the heart.

Idealists, like Philistines, are to be found in all walks of life: nearly all socialists, probably, belong to this class. They despise the Philistines for their single-minded devotion to success, but regard them as useful, if somewhat clumsy, implements for the glorification of truth. So that, when a sufficiently large section of the Philistines has been roused by the Idealists to the sense of an existing wrong, there ensues a religious or social revolution of considerable proportions.

Widely as the Idealists differ among themselves as to their formulas for progress or reform, and immoral as some of their acts and doctrines are deemed by the Philistines, it is nevertheless pretty certain that any such sweeping proposition as "Morality must go," if forcibly put, will be greeted by them generally with a scream of rage. Though they are willing enough to swell the Philistine cry of "lunacy," the chances are that they will end with getting it amended to "criminal lunacy." And if they perceive signs of defection in their own ranks or of awakening thought amongst the Philistines, no effort will be spared to bar the doors of society

to the introducer of the unsavoury proposition before it has had time to set up a widespread indigestion of established truths. For the Idealists share the Philistine reluctance to put to themselves seriously any obvious series of questions. An established truth, often hidden and forgotten, is the central stone of each of their set pieces. They differ from the Philistines in their avowed dissatisfaction with society as it is; yet their desire is to remodel it on lines that, when all's said and done, are essentially classic.

Their irritation at sweeping propositions is, then, readily comprehensible. For it is only natural that men who have had to take account of the repeated failure of ideals which they have made it their business in life to herald and prepare for should have conceived in the back of their minds sufficient distrust of these ideals to regard as dangerous any systematic attempt to demonstrate that they have never been and can never be realised. Passions once inflamed, any argument will do. The great point, then, is to crush rebellion as speedily as possible — to triumph over the rebel for the day and generation, regardless of reason or of the consequences to posterity. And the devotees of primeval law and of ideals derived from it are none the less glad or self-righteous in their triumph because they happen to know nothing of the rebellious doctrine in question and have no idea how they would cope with any doctrine whatsoever if left strictly to themselves.

The above classification of society makes no pretension to rigorousness; for it would be idle to deny that we have each and all of us more or less of both Philistine and Idealist in us, or that we are first and foremost the bread-and-beer brothers of the Proletariat. Here, indeed, is again and inevitably suggested the argument for our emancipation from primeval law. The purest Philistine, if allowed to do as he liked, would look amongst pure Philistines for a conjugal mate, for he would not only be suspicious of other women, but would be refused by them if he asked. The purest Idealist would wish his children to be like him and would make his choice accordingly. If we admit — what would perhaps be denied by either Philistines or Idealists of the purest blood — that there are limits to the possibilities of both Philistinism and Idealism, we shall see that the pure stock of both must in time run to seed. Unenterprising Proletarians of the purest breed would also disappear through this and other means. From each class, then, would be eliminated the purest of its retrograde elements, and the race would be perpetuated by those individuals who were most inclined to effect the agreeable exchange of an old state of dependence for a new one.

However rough my classification, and however long in coming might be any important results of purely elective breeding if unenforced by the other processes described above, I believe — to return

to the point now under discussion — the picture I have drawn of a novel idea before the bar of modern society will bear little retouching. What I meant by “outwardly peaceable times” should now be clear, also that I must regard the present times as no more peaceable inwardly than any others. A peaceful surface to the times depends upon the strength of the traditional illusions that we have been discussing relatively to the strength of such other ideas as of rational living, imminent famine, national greed, etc.

Certain conditions, then, are readily conceivable under which a novel idea may gain a more extensive and dispassionate hearing.

When a few Philistines become so besotted in their devotion to wealth and power that they proceed to grab as much of both as they can lay their legal hands on, their brothers turn against them and a political revolution ensues, perhaps with bloodshed but certainly with material and social disadvantages to the great bulk of the people involved.

Similar results may be expected when a clever Idealist gains the ear of the Proletariat and formulates for them, under a suitable disguise, the notions of Mine and Thine that prevail in the nursery.

When a capable warrior arises to lead an aggressive people, useful lives, valuable material, and timely efforts in all sorts of directions may be wasted to an even greater extent.

In all these and many other similar contingencies

that are either known to history or liable to materialise at any moment, the bulk of Philistines and Idealists alike are put to it to safeguard for the future their chosen manners of life. The Idealist is in despair over the sordid ugliness of the affair — which he may himself have precipitated — and is in constant danger of becoming the blackest of pessimists. The Philistine makes the most strenuous and whole-souled efforts to save his property and his position, and to ensure suitable surroundings for his children; for his faith in the value of wealth, education, and the existing social scale is an automatic process of reasoning which shows him how miserable he would be if the relation of his family to all three were considerably altered.

In the final resolution pretty well everybody emerges from the fray scarred and smudged and feeling that he has come off second best. It is difficult for a respectable Philistine to look another respectable Philistine in the face because of the unwonted things that both have done in the time of stress. It is difficult for two boon companions of Idealists to discuss the old projects with the old familiarity because each finds that his ideas have changed somewhat in the interval. It is difficult for the Proletarian to make up his mind who is to blame for the fact that he can hardly feed himself, let alone wife and children.

In sum, there has been a loss of confidence. The

Philistine distrusts the power of church and state to secure for him the fruits of his diligence and respectability; the Idealist distrusts the working value of his earlier conceptions of beauty and altruism; the Proletarian distrusts both his leaders and his fellow-winners of bread and beer.

While the damage is being reckoned up and the most needful repairs undertaken, many a new idea takes root in the public mind. Democracy, Christianity, Humanity, are some of the curious principles that have sprung from such a beginning. However elementary they may appear to us who have seen them tested, they have at least been new as avowed principles; and the accumulation of a sufficient number of such new principles as a heritage of the race will inevitably lead to the development of a more fundamentally useful idea. The honest thinker can bide his time: he never dies, and he has already learned enough to be able to beautify his own dwelling. If, in the future, a more general upset than is now on record again leaves society gazing at its shattered homes, ideals, and forms of law, he will be there to point out grey-haired Morality stalking, like Peer Gynt, amongst the ruins of a disorderly life and muttering vainly, "I have always endeavoured to be myself." And, if they have got eye-peeps to see, Philistine and Idealist will then realise that our putting into the mouth of Morality so sensible a precept as "Do as you would be done by" was a piece of the most cowardly impertinence.



But there is another possibility, and one more agreeable to contemplate. For, if I set up to be an honest thinker, I must declare that in the last analysis of which I am capable it is a matter of indifference to me whether a certain revolution be a bloody one or not, and that in every analysis except the last one I find a bloodless revolution more congenial and more reasonable.

The other possibility may be stated in few words. If a single man to-day preaches the desirability of rules of conduct more rational than those embodied in any known code of morals, general or individual, past or present, Eastern or Western, savage or civilised, he can hardly expect many listeners in either Philistine or Idealist circles. But if a hundred good prophets and true keep on dinning into Philistine ears: "Look here, you fellows, if you don't stop and think a bit, it's perfectly certain that somebody will make a rough house of your abode" — it is possible that the education of the Philistines would begin. It is even possible that all but they of pure blood would give such free play to mental faculties whose existence was hitherto unsuspected as to be able to join in the work of reform for reform's sake. And it is far more likely that the bulk of them would eventually conclude that the best method of keeping some small portion of Philistia intact would be to dispense with its outward forms and observances as well as with most of its stultifying privileges.

Once this were done, it is highly probable that the unstable condition of their ancient heritage would become apparent to them and that the new obligations they must shoulder would at least be more welcome than a return to the old drudgery which should have led to ultimate satisfaction, but did not.

“And you other fellows,”—thus our good prophets to the Idealists, — “if you won’t give over building your crowns and coronets of immaculate and undying beauty long enough to realise how uncomfortably they would sit on any mortal or immortal head, you will assuredly go thundering down to posterity as the most notorious party of sentimentalists that ever spread jealousies and disappointments over a credulous age. Beauty dies; and it is a new beauty that is born again. Until you have acknowledged that you cannot arrest those processes of nature in which man himself has a vital stake, you will be debarred from sharing in the best activities of the day.” Some such threat as this, if elaborated and duly emphasised, would probably incite our Idealists to redoubled efforts. We may even imagine them taking up the challenge in practical fashion and zealously organising innumerable little societies beyond the reach of both Philistine and rationalist-prophetic influences. In any case, it seems likely enough that the process of healthy disillusionment for the benefit of posterity would be hastened a good deal.

Any way must be a good way that leads to the general adoption of a rational view of death,— a more rational view than is now embodied in the will to live when nothing is to be gained for posterity, and the will to die when there is yet hope. For this is the prime need of the day. To satisfy it seems a small enough achievement, if we consider what lies beyond — an achievement no bigger, doubtless, than to rise erect after having always gone on all fours. It is nevertheless the first and most obvious concern of philosophy, for upon it hangs every problem of our social life. Hence the title of this chapter.

## CHAPTER VIII

### THE LOVE OF TRUTH

THIS chapter is the record of a series of random observations upon life — sheer assertions, some of which are so obvious that their sole justification lies in the supposedly cumulative effect of iteration. For others, less obvious, the justification has appeared in the earlier chapters of this book and will probably be readily recalled.

The tone adopted generally will be one that has not been conspicuous in the foregoing pages except by implication — a tone of discontent, even pessimism. And the uses of rational pessimism will be discussed, it being stipulated that no rational optimism is possible without a pessimism on which to rest it. As thus, — granted the desirability of making as much as possible of this human race of ours, contentment may be defined as the hope of lessening discontent. Progress, love, happiness, everything that is worth having upon Earth is completely dependent upon discontent. Without pausing again to apologise for the exceeding triteness of this statement — which is but one of our many local and inadequate expressions of the law of continuous

change — I will forthwith make elaborate preparations for a definition of the love of truth.

A satisfactory definition, even for the immediate purposes of a few more days of life, is doubtless impossible; for observe the implications of this law of continuity. A conception has been defined as "that which may be maintained in thought." This definition is perhaps convenient enough considering the limitations of language. But it is to be remembered that what is so maintained may never in itself or in its subject-matter remain the same, but must continuously be replaced by something which is new by virtue of the replacement. A true conception, relatively speaking, must ever lead to new conceptions in the course of which process it is itself modified. If it ever becomes rounded off and susceptible of complete and satisfactory expression in words, its usefulness is departed: it is no longer a conception. In sum, nobody may flatter himself that he has a true conception unless he persistently tracks down its implications and finds ever new ones running before him to show that all along he has been at fault.

Concerning truth, then, and the love of it, we must speak relatively. Truths are exceedingly various in nature and in practical importance; and the particular truth possessing the greatest practical importance is the one that finally removes from consideration the greatest amount of earlier truth. My

definition of the love of truth will be an indirect one, by means of particular examples and comparisons which may serve to show the varied nature of this love and so amount to a useful definition.

In some of these examples is involved our racial belief in the supernatural. Hence a further introduction seems desirable.

In the light of that most general truth which alone possesses ultimate validity, we have seen the supernatural and all other final causes relegated to the category of conceptions of impossible illusions. If a divinity were suddenly to appear in the sky before some thousands of us, perform other superhuman deeds, reveal unsuspected truths, and end with proclaiming itself the creator of the universe, we should doubtless be greatly puzzled by the occurrence, but we could not accept the divinity's account of itself. Indeed we must discredit this account more promptly than we discredit the testimony of our senses as to a hammer—that it is, once and for all, wood and iron shaped conveniently for the business of hammering. For our divinity and its proclamation would constitute a particular experience conflicting with the testimony of *all* other experiences. Not until it should have manifested itself for long ages in every single detail of all our lives, leaving no possible room for doubt, backsliding, apostasy, could we begin seriously to consider it as a factor ultimately to be reckoned with.

I shall soon bring under consideration some of the present consequences of similar concrete apparitions which are said to have been experienced in the past. Meanwhile let me give a definition, mainly classical, of the supernatural, and a similar explanation of the origin of our belief in it.

The supernatural, like the universe of one dimension, was invented or irresistibly suggested as an explanation of the omnipresent and inexorable unknown. That extra-terrestrial critic who has already been invoked upon more than one occasion would undoubtedly infer from knowledge of but a few of the conditions of our existence that we must, some of us all the time and all of us some of the time, both love and fear the supernatural. What with certain facts of which we are all aware: as love of one another, as death, as the inexplicable divergence of individuals from typical character, as the unaccountable advent of benefits ardently desired, as the unaccountable visitation of calamities when men were killing and stealing; and what with certain conditions of our activities of which we are, on any given occasion, partially or wholly unaware: as the tendency, embodying present discontent, to magnify the performance of past generations; as the cumulative distortion of impressions received simultaneously by numbers of people reacting upon one another while in the grip of a powerful emotion: — it is inevitable that gods and witches, genii, heroes, and

devils, should rise and hold us in their phantasmal sway; that all descriptions of unthinkable and undesirable hells and heavens should be intensely feared or impulsively desired.

At a time when those principles called scientific had not yet prevailed upon the generality of men to bring any great measure of reason into their efforts to account for any events of their lives, their visions of the supernatural might, under the appropriate conditions, possess vividness of beauty or of horror in an indefinite degree up to the point where life would no longer support them. That such was indeed the case is abundantly proved by those relics of past ages at which we now gaze with alien or profane admiration. For the religions issuing from these miracles of revelation were long ago outgrown and, most of the time since, have subsisted upon ignorance, cupidity, and the force of habit. Revivals there are, especially when the world has had an overdose of reason; likewise ingenious modifications and revisions; but, unsafe as is generally any forecast of the immediate future, it seems quite within the bounds of prudence to predict that the net result, in this future, of all revivals of and reactions against any religion based upon god or devil will be a decline of this religion as an influence among men.

But this is not to say that the god and the devil will necessarily disappear along with the church and the mosque. On the contrary, it seems highly



probable that they will lurk in the back of our mind long after we have openly and seriously repudiated them. For how shall any one of us of to-day, clearly recognising the crudity and insufficiency of divinity, ignoring the tiresome analogies put forward in the hope of a close alliance with more advanced conceptions, — how shall such a one know when he may be called upon to humble himself before the god that is deep-rooted in his past? Though he fancy he has come scathless through the gantlet of extreme anguish, fear, resentment, let Fate, the Inquisitor, play upon him a more subtly nasty trick than any he could have dreamed of — which is always possible, even in the days of enlightened arrogance — and I warrant he goes down on his knees.

Now to our instances of the love of truth. Let a man fancy that the particular love of truth to which he happens to be faithful is the only such love in existence, and he will not understand these instances. Probably, however, no such person will have read these pages; and to others the instances may be of interest if they are not too stale or obvious.

I have heard that a burglar was once caught because he stopped to write a note to the head of the family in which he said that he scorned to take the children's moneys and small trinkets.

Shibli Bagarag, at the court of Oolb, having good reasons of his own for concealing his identity, was so moved at the sight of barber's tackle that he be-

trayed himself in his impatience to execute a good job upon the unshaved king and courtiers.

John chid Peter for thanking the Lord for his dinner while so many were starving. He called this a colossal affectation, saying, "Thank your own wits, if you like, or your parents or your employers; but that you should really thank the Lord is beyond belief." And again he chid him for praying to the Lord for strength to resist temptation, saying, "You may yield to temptation; others are yielding even now. Is it not surely the height of presumption in you to notify your omnipresent and omniscient Lord of the occasions upon which you should be given strength to resist? Did He not endow you with reason which enabled you to recognise presumption and affectation and other undesirable acts in others; and is it not by this means that you and your fellow-men have risen from a more brutal state?" Peter replied to these chidings that the reported words of the emissaries of his god possessed for him sufficient evidence of inspiration to impel him to pray and to give thanks in accordance with their spirit, so far as he might understand it, and to hope that the perseverance of enlightened and pure-minded men might be the means of an indefinite elucidation of those passages which were now contradictory or inscrutable. To which John retorted that masses of men of an intelligence quite equal to Peter's and less hampered by racial talent for success, were observ-

ing more strictly the letter and the spirit of their faith, which was quite different from Peter's and hostile to it; furthermore, that other masses of men of equal intelligence and practical usefulness were insensible of the alleged evidence of inspiration in the written words of either faith; hence, of two different faiths alike conspicuous for their seeming denial of that reason which they signalled as a divine gift, it was impossible to say which was the better or that either was helpful to its votaries. He then reminded Peter of his religious upbringing and pointed out that he was presumably incompetent to judge of the alleged inspiration of the words of his faith, as were presumably his parents and his grandparents and possibly also his entire ancestry for many generations back. Peter replied that it was natural he should walk in the way of his fathers, especially as he had never learned of a better. And this ended the discussion. But it was now necessary that Peter should chide John as to his accounts, which were in a great tangle, and John was neglecting them. Peter offered his help; he was able and pertinacious; and the end of the matter was that John's accounts were made up for him by Peter.

At the meeting of a society of learned men, a paper was being read to show that Tacitus and Suetonius had considerably exaggerated the licentiousness of the period of which they wrote. But the reader had not gone far into the matter before he was interrupted

by a minister of the Christian religion who rose, trembling with indignation, and thus appealed to the chair: "Sir, I protest against the reading before this meeting of any paper tending to palliate the vices of imperial Rome." Some dismay was apparent among the coreligionists of the protesting minister, from which it might have been gathered that he was a better lover of truth in his way than were his judges, who ignored their own less obvious cranks and simulations.

We smile when the minister, with upturned face, delivers himself thus: "Paradoxical as it may seem, O Lord, it is nevertheless true. . . ." Yet it is precisely this sort of thing that we are all doing to our gods, day in and day out: insulting their omniscience with prayers not to forget us; discrediting their omnipotence with protestations of loyalty or hints of virtue unrewarded or sufferings intolerable; accusing them of vaingloriousness with the idolatry of bowed head and bended knee. Aged degenerates sun themselves, as occasion warrants, in the peace that is their Lord's, when all is turmoil outside their narrow circle, ay and outside the narrow interval in which they are permitted so to bask. Disappointed women hug their Saviour to their breasts; and, when returning hope enables them to dispense with this ideal comfort, regard their desertion as an act of weakness indeed, though by no means to be invalidated.

And so on, *ad infinitum*. For some obvious reason or other the doll-like rôle of divinity has never been a nice one, and nobody could ever have enjoyed playing it or expected to carry it, with its rags, tatters, and stains of scratched and smudgy fingers, beyond the threshold of the nursery.

The man who said, "An honest god is the noblest work of man," must — if he had any serious expectations in the matter — have ignored one of the negative necessities of the case. For if men are themselves too timid for any but the smallest and rarest doses of theoretical honesty, a god that may be set up by any considerable number of them must inevitably lag far behind their best thought.

These considerations, like all others of the sort, bring us back to nature — which, in the case of men, generally means back to Fear. For it is always the dishonesty arising from this dread of death and suffering that makes life dull to the spectator and distressing to the actor. The actor need only be mentioned: he will agree to much distress; whilst the candid spectator will not pretend that the acts or utterances of our politicians, jurists, philanthropists, or men of letters are in the main interesting. If said spectator could know everybody in the world, he would doubtless find so much of interest that he could at once set about making the world interesting to all in that degree of which it is immediately capable. As it is, he must take the best that is available in the

art of all ages, and even then will he be conscious of a mighty void.

Everybody can recall instances, similar to those cited, of contrasts between the different loves of different truths. There are many known shades of theoretical truth, and perhaps as many of practical or material truth; the contrasts between these two classes of truth are sometimes very sharp, and there is no reason to believe that an ardent lover of the one will have any conspicuous attentions for the other. The relative prominence of the two motives in individuals depends, of course, upon temperament and surroundings; at best, we know very little even of that little which our neighbours pretend to know about themselves, so that no satisfactory generalisation on the subject based upon observation is possible. Certain theoretical considerations, however, render it probable that the honest theorist may be just as big a practical liar as the dishonest theorist or as he who evades theories altogether; and especially that he who most signally misconstrues, and so is alarmed by, the implications of the soundest theory may be a relatively scrupulous truth-teller in the affairs of actual life.

For, in the first place, the honest theorist regards any event from one — or successively from all — of at least three separate and easily distinguishable levels of thought. The highest of these is the level

of emotional indifference, of abstract curiosity,— what, for evolutionary purposes, may be called the level of rational optimism. This level is like the summit of the Matterhorn; it is the least frequently attained, life there may not be indefinitely prolonged, and the gradations between this and the next lower levels are the sharpest. Far below lies the Vispthal, the valley of everyday needs, where the wood is to be chopped, the cheese to be made, the marrying and giving in marriage. Here is theory of small account, and the facts in any case are definite and significant. Midway between the two is the Schwarzsee, the level of rational pessimism.

Now, the walk from the Vispthal to the Schwarzsee is an easy and obvious one; the zealous walker arrives unexpectedly early and may look forward to more such afternoons without number. But why should he desire repeated visits to this sombre lake? Because, I suppose, he is of the enterprising who will not be for ever shut in by the unthinkable walls of Vispthal. Grim though the Schwarzsee, it images those lovely dazzling crests which are denied to the imprisoned Visp; and the mere sight of these and then of Visp, a thin, fuming futility in an ancient cage, calls up the hidden hamlet and wakes rebellion in the breast. From hence the prospect is not so wide that the rude hut called home may be regarded calmly in its inevitable relation to the general scheme of the land. It is a thing to be railed at,

violently abused; to be torn down and replaced by a better if possible, but at all events to be abused: foresight and common sense demand this.

In fact, the Vispthal has greatly changed of late: some think for the worse; I do not agree with these. Squalor is no longer there; the scanty pasturage and sparse fir-woods are no longer deemed worthy of attention; new architectural excrescences have appeared, some hideous, others noisy, and these are not thought to be satisfactory as such.

Certain it is that habitual frequenters of the Schwarzsee of pessimism are less likely to make good wood-choppers or cheese-makers, head-waiters or railway guards, husbands or fathers, than they whose visits are rare or forced. As to the facts in any case where definiteness is demanded by their workaday fellows, they are prone to be scornful of those conditions of life which make possible the telling of the obvious lie as well as of the consequences of the lie to others. They show, furthermore, a lack of interest in such truth as is most commonly expected of them, and are disposed to doubt if it really serves its purposes. If they are travellers, they know that whenever, on returning from a foreign land, they describe faithfully what they saw there in the language of their own, they are likely to convey essentially false impressions which might have been averted by departures from the literal truth or by judicious falsehood. Or if they are historians of a bygone



age or painters of a landscape viewed under exceptional conditions, or if they are quite simply narrating the most ordinary of occurrences in their own day and in their own community, they are always aware of the impossibility, when nothing like the whole truth may be known and shown, of satisfactorily serving the spirit of material truth by faithful observance of its obvious suggestions.

Hence they should be more prone than another to lie themselves out of any tiresome difficulty of everyday existence, especially if the difficulty be obstructive of honest theorising. If they are the most honest and pertinacious of theorists and have climbed the Matterhorn, they should certainly not be inclined to a turbulent life, but should instead prove the most rational and unselfish of law-breakers, whose effect upon posterity may be incalculable.

For it is not by cheese-making or by wood-chopping or by any other manner of minding one's own business that reforms in thought, speech, or government are brought about. Nor is the business of cheese-making or of governing even sufficient to support itself; for no amount of attention to the business of either, through no matter how many generations of men, will result in an indefinite improvement in its products. For the improvement of cheeses or of governments it has been found that violent abuse and abstract curiosity are alike indispensable; hence the two levels of rational pessimism and rational

optimism which are more or less familiar to those necessary adjuncts of any society called honest theorists.

From the above considerations it would seem inevitable that they who have not breathed the pure air and over-rare of the Matterhorn should set greater store by the appearances of the valaisian life below; should make more of their loves and hates; and should ascribe a greater definiteness and importance to immediate questions of fact.

We have now to consider some of the well-known menaces to theoretical truth, to material truth, and to both. And let us first examine in its general aspect the choice constantly imposed upon truth-lovers — as we are all of us in our way — between conservatism and radicalism. Here is a loaf, or a wife, or a battle, whose fate depends upon my decision of the moment. I must act, — and in a way that conforms either to the known principles, egoistical or altruistical, of my fathers, or else to a departure, egoistical or altruistical, from these principles that originated in my own or in some other rebellious mind.

Conservatism, regarded as an end, not as a means to radical change, means the clinging to that which is of necessity worthless.

Radicalism is essentially inexact; its results are invariably different from its expectations. It means

the straining after that which will prove either retrograde — what we call worse than worthless — or else adaptable to practice in the future, near or remote.

In theory the choice is not difficult, for conservatism has no existence in theory.

But in immediate practice, seriously to espouse radicalism means to be prepared to sacrifice one's own life and the lives of both friends and enemies, not because of the nature of radicalism, which is the law of all nature, but because of the inevitable opposition of conservatism. One of the tried conservatist weapons that is always turned against the political radical is that resounding catchword which we have already considered at some length — the "sacredness of human life." If the radical in question be a serious or a determined one, the result of the conflict is generally war, death, and desolation. But alack, the poor radical! He is more often determined than serious, more often frantic than determined; and in any case his life-prospects are not bright. For he is the rising man, generically; hence the odds are always heavily against him, individually. The spine of human nature being still of a stiffness almost prehistoric, he that bends it in the slightest will probably break his own back in the attempt.

Now, society, if you like, is as it should be: what is right. But looking and thinking long on this rightness, you shall know that if none of us to-day

can with decent composure make any new experiment, whether in politics, art, physics, or philanthropy, it is because of our blushful efforts to evade the law of change.

Here, then, is an incentive of incentives: the incentive to obey. Your greeds, hates, and ambitions may be the fiercest of the day: futile you know them in proportion to their fierceness; sickly cold with gratification; chiefly significant in their long painfulness and momentary bliss, and in the second and the third alternation. Such are the lives of our children, appropriate to the degree of their experience.

Backward into children, however, we may not grow, nor backward through the centuries. We may not even wish for this reversal, for we may never take the first backward step in act or in thought. We may yearn to the beauty and fresh contrasts of the child, knowing that these are no more for us; in a marble Pietà we may recognise a power of pathos that turns our actual woes to flesh-and-blood banalities; heroic verse and painted cardinals — do we know of greater differences? — alike remind us of the relative drabness of our age. But modern maturity once attained, we find that nothing is possible but a still more modern maturity in which, indeed, childhood and heroism may become to us more vivid, but inevitably and desirably from the view-point of maturity and modernity. We literally

could not exist in the days of the marble Pietà; the blessing of any cardinal who might be painted so wondrously would doubtless consign us to our graves.

Thus we may dwell fondly on the remotest, and in the eyes of our neighbour perhaps the most unlikely, of consummations; we may confidently believe that the last and best of knowers will know our heroes and cardinals far better than they knew themselves; but we may not desire an impossibility. And the more completely we succeed in bringing forward our past for future contemplation, the more abhorrent becomes the futility of a retrogression into this past.

To recur, now, for a moment to one of the most conspicuous and indispensable of our childlike eccentricities which is aptly described in the words of the poet:

“Lead me to the precipice,  
And bid me leap the dark abyss:  
I care not what the danger be,  
So my beloved, my beauteous vision,  
Be but the prize I bear with me,  
For she to Paradise can turn Perdition.”

He who has escaped the sublime egoism of this mania has missed the best there is in the actual living of life and will doubtless be suitably recompensed after the dying of death. It is said that certain exceptional individuals have maintained emotion upon the plane of this stanza throughout a considerable portion of their lives. These, then, have other things to learn; but, to the rest of us,

one of the most interesting feats of knowledge will be the ascertaining of the quality of that past experience which has made possible such a monotony of egoism. The poet himself seems to regard it as of exceptional occurrence, for he has much advice to give of the following nature :

“If thou the love of the world for thyself wouldst gain,  
mould thy breast  
Liker the world to become, for its like the world loveth  
best.”

Repeatedly to vaunt the uses of philosophy is perhaps presumptuous, yet not altogether without benefit. Philosophy, as is well known, may also scorn the precipice and again, like love, turn pale. A comparison of the two influences in average men of to-day would doubtless reveal love's triumph the oftenest; yet lovers and philosophers have already said enough to convince us that the conflict wavers with the point of view, — point of view of the individual, point of view of the moment. Let him who witnesseth the exaltation of the one to the abasement of the other expect at any moment a reversal of fortunes.

Now, the scope of theory, based upon the first principle of continuous change, is unlimited; it may dispel any superstition whatsoever. But such theory must generally be kept to the theorist. In certain past ages theory might do no more than supplant one superstition with another. In the

present age, when the best thought is scientific, new superstitions have indeed comparatively little chance of taking root; but, on the other hand, first principles must be generally neglected. Doctrines that have originated anywhere but in a remote past or an up-to-date laboratory are regarded as either dull or dangerous. For attacking the most interesting of all problems, and the one bearing the most powerfully upon every detail of our daily life, one-half the world equips itself with well-seasoned superstitions, the other half with well-oiled machines. First-principle theory, though aware of their incompetence without her aid, is never lacking in gratitude to both machines and superstitions which supply her with varied incentives. She must, however, be content with scant recognition in return. Neither in church nor in college is there fostering of the curious mind that has not for the subject of its research some visible, tangible thing, as a book or a brachiopod. The remoteness of reality and differences of opinion as to the knowable cause us to instruct our intelligent youth to confine their efforts to the business of improving their knowledge of that which we call fact. We think them safer thus, and, according to most machinists and superstitionists, we are all in a highly precarious situation at any time. This task of improving their knowledge of "the known" upon which we start our patient youth, requires that they shall brush past some of the most

obvious implications of this known which might lure them into by-paths where wise men fear to tread. Not even shall their leisure moments be given to such unprofitable and possibly perilous excursions; far better that they devote them to rhetoric, that most tried exorcist of importunate queries. Thus it is that politics and faith alike are approached with that lack of seriousness and excess of gravity which are so conspicuous in our intellectual life.

Theory at the political dinner table requires a sleeve to smile in; otherwise the bones of scorn and reprobation will assuredly be flung at her head. Time and again has she made bold to tell both politicians and machinists that the eye is the deceiver, the mind the corrector; that what is most distinctly visible or solidly palpable is *ipso facto* most conspicuously illusory; that not alone by the weighing of policies and the measuring of energy may they ever come to that apprehension of the imponderable and immeasurable which will strengthen and enhance all their material activities; that to every fallacy in their dreams, a score invade each waking moment. She is perhaps not denied; is sometimes even assented to. But rhetoric then wags her to the foot of the table with a mighty swish of glowing axioms, rudiments of knowledge; and finally he says, "All this you say is neither here nor there," only in a humorous and pungent manner defying contradiction. For the snubbing of theory is often a side-splitting perform-



ance, in the course of which even superstitions may be cheerfully forgotten.

The flow of words, rhetorical and otherwise, from friendly sources and hostile, to which theory is at all times exposed, constitutes another serious menace to her existence upon Earth. Leaving out of account the inevitable self-assertiveness of man, the current justification of such extreme loquacity is that by this means useful ideas are developed. It is to be observed, however, that so many words have already been spoken and copied into books that numbers of our learned ones declare they never hear anything novel. They may believe the novel to be there, some of it in their own minds; but when it comes to be uttered, it somehow gets diverted into ancient channels of speech which conceal its identity. Hence theory protests in self-defence that if our youth were counselled to think twice before speaking instead of speaking twice in the hope of an idea,—the latter being the general practice of their fathers in attacking any but the most immediately personal questions,—their conversation might indefinitely gain new advantages of utility and vivacity.

Another renowned and mighty foe to theory is what we call, perhaps not altogether fairly, “the wisdom of age.” Young people seem often to possess it in marked degree. However, a genius grown old is apt to lose much of his desire for a “clean sweep” of existing institutions. His judg-

ment may have grown less robust, and he may have received honours and wealth, *i.e.* grown into the habit of living the life that is made for him rather than the life that was his mature choice. How to prevent a loss of robustness of judgment with advancing years is indeed a difficult problem which will not here be discussed. To the genius, however, one aid to a happy decline would be his resolution to accept as few prescriptions as possible from them who are so clearly in need of his own prescriptions.

The genius or wisdom of old age, as we generally know it in fact, is a canny wisdom less likely, for example, to plunge a nation into civil strife than is the genius of youth. The narrower term of remaining life appears to conduce to a narrower view of posterity and to a higher estimate of the importance of immediate concerns. Hence, amongst a race that has not attained to as rational a view of death as is immediately within its reach, the wisdom of age is naturally approved in the cooler moments of youth and age alike.

Now, the "clean sweep," as has been pointed out, will leave the stable still very dirty, far from Utopian. But, such as it is, it is perfectly certain to come; it is likely, moreover, to be pretty rapid and thorough according to its lights. For, once morality is seriously and generally discredited, the spirit of compromise is done for, and every existing institution from architecture to education must be entirely

reformed. May the genius, then, whether musical or political, stick to his clean sweep through thick and thin, through youth and old age; only by this means may his characteristic sanity and common sense be preserved, to say nothing of his peace of mind. Our civilisation is certainly not worth taking for granted, and they who take it so are much worse off than the others who fall in the course of attacks upon its strongholds. Root and branch, everything is worse than it need be. What more obvious than to make it all better?

But one more of the many obstacles in the path of knowledge will here be mentioned. This one is older than history, though its proportions vary from age to age. To some who are spoken of as profiting by it, it remains invisible. Others who are spoken of as being especially hindered by it are sometimes roused to fury by the sight of it. Even the conspicuously dishonest make capital out of their assaults upon it; and probably no philosopher worthy of the name has omitted at some time or other to rant at it like a very demagogue. By it the way is barred to each separate column of truth; theoretical truth, the letter of material truth, the spirit of material truth. Every colour of practical honesty and dishonesty is rallied to its defence, and in the attacking army are their blood-brothers.

Of so celebrated an excrescence in the rugged surface of human affairs it is hardly to be expected

that anything essentially novel should now be said. It is well, though, to go on reiterating its rightful name which is the fear of a too sudden abolition or reapportionment of the material prizes of civilisation. Its victims are the greater portion, though by no means all, of those who possess a considerable property or influence. Amongst them are a handful of individuals competent, by training, opportunity, and inclination, to organise and control the governments of peoples; and these few protect and are protected by the numbers of their class which includes all the spendthrifts, misers, drones, and respectable nonentities, as well as most of the rhetoricians, of the Earth. Nearly all of them have received the education belonging to the age, and their wealth enlists in their service both educated and uneducated outsiders who do not approve of the other uses of this wealth.

Whether a considerable curtailment of the material and social privileges of this class would, at the present stage of human development, mean political and social anarchy until another such class arose, is a question often publicly discussed by its members, most of whom, however, do not need to put this question seriously to themselves, the personal motive sufficing to determine both action and utterance. It is not, of course, that they are pre-eminently happy in their eminence, but that they dread the misery of poverty, loss of influence, or death, for themselves

or for their friends. For there are many among them who would fear but little for themselves alone; and with these it is the thought of family and friends which enables them to overlook the greater and actual misery of others.

Now, a little knowledge is perhaps a dangerous thing; but the unfortunate point about these privileged victims is that the bigger and newer the knowledge the more dangerous does it appear to them. Any discovery, whether in a book or a brachiopod, which, though avowedly partial and unpretentious, makes, nevertheless, an advance in knowledge sufficiently great to entail some overhauling of general conceptions, may indirectly exert a considerable influence upon stocks, tithes, and elections. Hence this renowned and world-old conspiracy of wealth and power, this stanch fraternal despotism which often relishes the strenuous lashing of the demagogue but misdoubts the patient tapping of the investigator.

It is doubtful if, for some time past, the conspirators have exchanged so much as a wink or a nod. The wink and the nod are of a humiliating vulgarity besides being wholly unnecessary. Even those supporters of the old régime who are unaware that any conspiracy exists have come to behave automatically in a manner that furthers its purposes. Such incurious optimists are, for the most part, on the outskirts of their class; and even theory, to say

nothing of demagogues, must preach at them that they are of no more avail for bettering the condition of the race, their descendants, than are those pessimists that gape or howl at every obstacle. Such incurious optimists will never climb the Matterhorn. Human life upon Earth is made possible by pessimism; if we have none of this, we must get some, or else degenerate — die of our own stagnation before death overtakes us.

The ambitious efforts of our eminent brethren to evade the law of change are doubtless a fit subject for ridicule which, however, requires a transcendental wit to wield it. While to jest of the hereafter to those who are mourning their dead is in bad taste; while the unhappiness of the rich is so far from despicable that millions make it their sole aim in life; while those who attend political gatherings look for thunderous oratory to play about the surface of their complaints, but are stunned and angry if the lightning strikes near their individual homes; finally, while licensed educators believe in their impotence, as they doubt their willingness, to surround these view-points with the impassable barriers of theory, — so long will the earnest reformer be constrained to don the gravity of the judge or, at best, the grave playfulness of the diner-out; otherwise his efforts will probably be construed as an intellectual exercise whimsically indulged in for his own amusement and not to be seriously considered in connexion with the

stern business of life. But even with gravity donned and fitting like a glove, his task, whether congenial or not, will certainly be an arduous one. If, for example, he points out the starving drunkard and his invalid children, and pessimistically desires affluence and influence to bring about the impartial chloroforming of both, it is more than likely that the finger of influence will be laid on the nose, the hand of affluence thrust in the pocket, and the result will be a meal for the drunkard and a home for his and other invalid children. Where affluence and influence are concerned, ocular evidence is the thing.

## CHAPTER IX

### STYLE AND THE PHILOSOPHY

I BEGAN with certainties ; *i.e.* my first two chapters contained little else than statements of the ultimate principle of Change and accounts of its origin in thought. In the third chapter I was also dealing with this certainty which enabled me definitively to remove from consideration such questions as the Whence, the Why, and the What of the universe. But much the greatest portion of this chapter was devoted to the How of the universe, and here I was treating of particular probabilities and possibilities — logically and mathematically so far as logic and mathematics might apply ; the first principle being invoked whenever logic and mathematics pointed to it directly.

The subject-matter of the remaining chapters has, for the most part, been of a still more particular or speculative character. In these chapters the facts of life have been considered in a relation more immediate than that of their ultimate basis or implications. Here again the logical method is seen at work, checked from time to time by ultimate theory :



the results may be roughly summarised in the equation,

$$\text{Rational Life} = \text{Fact} \left( \frac{\text{Logic}}{\text{First Principle}} \right).$$

The data, of course, are dubious: Fact being invariably illusory except as a whole; Logic, a delightful and indispensable factor but with vexatious limitations imposed by the necessity that all existence possesses ultimate significance; First Principle, unimpeachable in itself but reserved and taciturn in the company of an embryonic race. Hence the most plausible exposition of a rational life may not be invested with an extreme degree of probability.

The above recapitulation is by way of disclaiming an absolute intent in such phrases as "It is certain" when applied to events that are expected to happen within a definite period of time. I have not used "It is nearly certain" or "It is highly probable" in such cases because I have meant to indicate the degree of probability that is commonly expressed by "It is certain." Every "It is certain" now in literature will eventually have to be eaten, and I do not wish to suggest that mine will be the first to go. The one absolute certainty has been so often and variously stated in the course of these pages that ambiguity can hardly arise from my adoption of the usual practice.

I have also thought that the freer, less rigorous, manner of treatment of the later and more speculative

portions of the work would be more readily comprehensible in the light of such a recapitulation. Of course I have not meant to imply that policies of education, government, philanthropy, etc., should not be painstakingly developed. What I have indeed meant to imply is that the policies now most urgently in demand and most painstakingly to be developed are destructive in character; that the first article in any programme should be a disavowal of any seemingly positive or permanent elements in this programme; that any programme for the adults of the race should be rated the higher as there is less of discipline and government in it.

Three more points in the literary style of this work should perhaps be explained.

#### LONG SENTENCES

Given language (or, at any rate, the English language) as it is, a natural deduction from this philosophy would seem to be that the terser or pithier the phrase, the lower its value. Catchwords and striking labels must be eschewed and all terms taken with plenty of salt. I cannot place unbounded confidence in this deduction;<sup>1</sup> but I am tolerably certain that, for any satisfactory exposition of this philosophy, long sentences must be the main dependence.

<sup>1</sup> Modesty should prevent me from giving, as a reason for this doubt, my humble belief that I was a very bad writer.

When our minds are constantly liable to wander from the printed page, it is the terse or pithy phrase that has the best chance of fixing the attention and impressing the memory; and conversely, long sentences, even when constructed with the utmost care, are apt to prove troublesome to the reader unless the subject-matter is of absorbing interest. Here, I suspect, is one of the unresolved discords of all philosophy, and the resolution of it should prove an engrossing task to future writers.

#### THE GENERIC "WE"

I can imagine a conventional philosopher or scornful critic saying of me, "The author makes a free and altogether unjustifiable use of the generic 'we.' He assures us that 'we regard as out of the question' certain contingencies which, I must protest, we do in fact regard as quite within the bounds of possibility. We are told that 'we cannot accept the traditional explanation of this occurrence' when it is precisely the traditional explanation of it that most of us do accept."

I should expect such comments as these from any who had funked the first three chapters of the book and begun attentively with what they regarded as its sole practical outcome. And from others who had made a conscientious effort to read the whole book I should perhaps expect the following: "The generic 'we' is here seen in the most curious and

kaleidoscopic combinations. On one page 'we' are the stout adherents of the most incredibly radical dogma, and on the next, lo! 'we' have become Tory in the extreme, the bitterest opponents of our earlier belief. Who, pray, are these mysterious 'we' of the topsy-turvy ideas who are as ready to repudiate these ideas on one occasion as to proclaim them inevitable on another? Would not the author have been wiser to have spoken for himself?"

From their respective points of view I must admit the justice of these remarks, so far as they go; I decline, however, to accept the smallest personal responsibility for the incongruities alleged.

For, in the first place, I must declare that to say "we perceive this or that to be inevitable," when the point is a disputed one, is merely to follow the example of conventional philosophers. History and conventional philosophy have utterly failed to prove — or to show even the slightest probability — that the numerical strength of its adherents is an index of the soundness of a doctrine. Hence, without needing to reaffirm the conclusion on this point which is to be drawn from these pages, I feel at perfect liberty to speak generically of "us" when we are only two, or even when the plural must be referred to the future. The unjustifiable generic "we" being established in philosophical writing, it becomes on the whole desirable for any particular writer to adopt it; otherwise his readers will be distracted by pages

bristling with unusual *I*'s, *me*'s, and *my*'s, or confused by long circumlocutions which, after all, must fail to meet the requirements of particular cases.

And finally, I must impute all blame for the capricious behaviour of my generic "we" to the genus itself, *homo*. In doing so, I am guilty of another apparent inconsistency. As thus: if I regard myself as deserving of expression through the generic "we" just as much as any sect, nation, or race, because my perceptions and inferences may be just as good as theirs, why should I demand tolerance for the caprices and self-contradictions of this same generic "we"?

But if any conclusion may safely be drawn from the later and more speculative chapters of this work, it is this: that the life of each individual member of the human race must inevitably shift from one rational level to another, thence to a third and back to the first, and so forth, all levels being mutually irreconcilable according to any practical philosophy. If you are of us humans, you must take our history for granted; being a man, you must partake in some degree of the advantages and disadvantages of *genus homo*.

In the fourth chapter, Reason was the name given to the motive force of human life: the essence of appetites, quarrels, philosophies was to be regarded as the process of putting two and two together. If you are a bigoted Tory, you are constantly putting

two and two together — as, for example, Somebody gave me this land; I seem to be living on it more comfortably than I could otherwise live: hence, the practice of giving land is a thing to be upheld. If, on the other hand, you are an incredible radical, you are putting two and two together in such wise that you are pretty certain to upset the Tory's reasoning sooner than your own. But you are undoubtedly at a disadvantage if you forget that you are a man, *genus homo*, and that consequently there is Tory in your make-up. For somebody else is sure to discover where lie your intolerance, your snobbishness, obstinacy, loyalty, tender-heartedness, and superstitions, and so you will suffer a loss of confidence.

To confess to Tory proclivities is a highly becoming proceeding in any radical. It is not only intrinsically the most rational confession possible but it implies the admission that Toryism is not incredible. Hence it is an effective weapon against the Tory who is unaware that he is primarily a radical; and with its aid you will avoid those moments of disillusionment during which the ignorant Tory might otherwise buy you off.

I have not undertaken to assign definite values to the different levels of reason. Of two different views of the same particular problem of life I do not pretend to say that one is *necessarily* more rational than the other. But the probabilities in every particular case reviewed in these pages have, I believe, been

indicated clearly enough. I have myself, at different times, taken seriously all the beliefs that have been mentioned and am prepared to see their ghosts rise up before me at any moment.

#### THE RATIONALE OF DIGNITY

In the exposition of a philosophy that deals with the facts of daily life mainly under general heads, it is hardly to be expected that occasions for the use of colloquial, slangy, or any other conspicuously ephemeral expressions should often present themselves. It is, however, entirely in consonance with the principle of continuity that such occasions, when presented, should be embraced. And, the more ephemeral or speculative the subject-matter, the more pointedly do colloquialisms suggest themselves.

But for a certain consideration presently to be mentioned, it would seem rather curious that writers of serious works went in so little for colloquialisms. One of the best-known facts in history is that our languages are all founded on colloquialisms and that it is entirely the chance of a passing taste that preserves certain colloquialisms longer than others. Just as it is impossible for any evolutionary race to set up a marble hero as a model of manly beauty for all time, so is it impossible—and still more obviously so—that we of to-day should have chosen to cling to those particular idioms which appealed to our fore-

fathers of thirty generations ago. A changing idiom, too, is supposed to be the mark of a progressive civilisation, the more barbarous races retaining their idiom intact for comparatively long periods.

But idiom, we are told — and doubtless wisely — should not change too rapidly; for one thing, confusion would then be produced in all the business of life. We are told, furthermore, that it should change according to a reasoned appreciation of the changing needs of life and thought. This, of course, it has never done. It has, instead, changed in obedience to an authority in which the best even of current æsthetic principles have counted for little, whilst the most vulgar of fashionable whims have counted for much. All things considered, the most obvious course to pursue is to submit language to the purgative process that was outlined in my seventh chapter. This means the reversal of the existing system of imposing restraint on others as well as on oneself in the choice of words and construction of phrases. It means the repudiation of all those various attitudes which have arrogated to themselves the name of dignity.

Here we encounter our ancient foe in another of its many guises. For the rationale of dignity is the fear of death.

An assumption of dignity, whether natural, habitual, or forced, must place an added and unnecessary limit to the merit of any serious performance. For



it brings into the performance an element that is not only ultimately lacking in relevance but is certain eventually to defeat its own immediate purpose. This element is the consideration, How will the performance be regarded by other people? In a perfectly serious performance, — *i.e.* in the practice of an art for its own sake, — we have seen (Chap. II) that such a consideration could have no place. So much for the theoretical objection to dignity.

The more immediate practical objections are many; here are two of the important ones.

No matter what I may be trying to do seriously, I am serving neither the art itself nor its votaries nor the general public if I merely avoid obsolete barbarisms and endeavour studiously or passionately to produce a new example in accordance with the best established canons of taste.

If I am seriously composing a symphony, I may not attempt merely to excel Beethoven in his own field. Perhaps this would be practically impossible, and an interesting question is whether it would also be theoretically impossible. But, supposing it to be actually possible, I must nevertheless try to improve upon music as Beethoven and all subsequent composers have known it. I may incidentally try to out-Beethoven Beethoven, but this phase of my work must be explicitly qualified. Any symphony seriously conceived and executed by me must unmistakably contain new subject-matter or a new mode of

treatment, or both. I am certain, then, both to offend and to modify the musical taste of the day. If I offend it much, I may modify it much or little; but if I modify it much, I must offend it much. However slight or fleeting the offence, I shall produce at least a momentary impression equivalent to that produced by an obsolete barbarism — the impression of something out of place, not belonging to the art. If, on the other hand, my symphony quite fails to offend the musical taste of the day, I am assuredly not a serious but a futile musician. For I shall have stated explicitly that, so far as I am concerned, the musical art is penned in by an impassable barrier. And my dignified consideration, How will this performance be regarded by other people? must eventually be answered by these people in one of two ways: either he is no musician or the days of musical art are numbered.

Similarly, if I skate with unflinching reserve and self-control, my performance will doubtless be more dignified than if I fling arms and legs about in indiscriminate fashion. But if I do not eventually depart from my reserve, I am recognising an established limit to gracefulness in the art of skating.

The other phase of dignity, here to be mentioned, which renders it incompatible with the serious practice of any art, has reference primarily to the art itself and only secondarily to the artist and his particular performances. It is, indeed, commonly termed the dignity of art.

Now, the dignity of art is a fine phrase and doubtless entirely praiseworthy if by art is meant everything that is done or may be done. But the need of such a phrase in such a sense is rather dubious. The "significance of existence" will probably do quite as well.

But the dignity of art generally means the dignity of some particular art or collection of arts. And the man who strenuously upholds the relative dignity of a certain one amongst the arts cannot himself be a serious votary of this art, for he is exalting it above its own possibilities and is consequently working it an ulterior injury. In the seventh chapter of this work I stated flatly what I believe to be the inevitable inference from a candid consideration of the modern world: to wit, that philosophy is the prime need of the day. But nothing could be farther from my intention than to ascribe to philosophy an enduring precedence over all other arts. To try your hand at working out the quantity,

$$\text{Fact} \left( \frac{\text{Logic}}{\text{First Principle}} \right)$$

is a pretty enough exercise and congenial, *provided* it is needed. But for my part, I should be jolly well pleased if it were not needed and more time could be devoted to dancing and playing the flute.

To some readers it may seem strange that I should choose dignity for the butt of this tirade when similar arguments might be directed against many other

phases of thought and conduct,—for example, frivolity. One justification is that an attack on dignity, like the espousal of philosophy, seems to me particularly timely. In no age, I believe,—at all events in the Western world,—has a frivolous or reckless way of living stood out in so sharp contrast with the general prudery of speech, gravity of demeanour, and timorous reserve of thought itself. Like an undeveloped Atlas, too soft of sinew, we stand upright with exceeding stiffness under this swollen civilisation of ours, hoping thus to mask the trembling of our limbs. We have not even the support of a powerful religious Puritanism which, in its day, was as conspicuous as are the follies of gilded youth in the present hypochondriacal age.

But the temporal justification is of small importance in this matter. The many attitudes and sophistries that have chosen to associate with themselves the name of dignity or worth have been common enough in all ages; and the strongest argument against them was complete before this chapter was begun. It is sheer Tory chicken-heartedness that makes me urge the point. For I cannot take up a newspaper without seeing the accounts of decorous religious and temperance meetings which encourage underpaid mill-hands to go on with the business of fattening the overfed rich and bringing up children to do likewise. What else, indeed, can our preachers and philanthropists do? When the

whole world is dinning into their ears the supreme significance of death, it is small wonder that they should insist on the sanctity of all human lives and the dignity of the long and decorous ones. However — lest I should soon write myself down an out-and-out Pharisee in an elevated style, I will close, with a recommendation to the reader to take another look at Chapter VII.



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